MARYLAND HISTORICAL TRUST
NR-ELIGIBILITY REVIEW FORM

NR Eligible: yes ___
no ___

Property Name: Edgewood Arsenal Industrial ~~Area~~ Survey District Inventory Number: HA-2069

Address: Edgewood Area, Aberdeen Proving Ground City: Edgewood Zip Code: 21005

County: Harford USGS Topographic Map: Edgewood

Owner: U.S. Army Garrison, APG, Department of the Army, DoD

Tax Parcel Number: NA Tax Map Number: NA Tax Account ID Number: NA

Project: NA Agency: U.S. Army Garrison, APG

Site visit by MHT Staff: X no ___yes Name: _____ Date: _____

Eligibility recommended ____ Eligibility **not** recommended XX

Criteria: X A X B X C X D Considerations: ___A ___B ___C ___D ___E ___F ___G ___None

Is the property located within a historic district? ____no ____yes Name of district: _____

Is district listed? ___no ___yes Determined eligible? ___no ___yes District Inventory Number: _____

Documentation on the property/district is presented in:
MIHP Form HA-2069

Description of Property and Eligibility Determination: *(Use continuation sheet if necessary and attach map and photo)*

The purpose of this MIHP form is to evaluate 130 buildings contained in the Edgewood Arsenal Industrial Area (E5000 blocks), both individually and as a district, applying the National Register Criteria for Evaluation (36 CFR 60.4 (a-d)). The Edgewood Arsenal Industrial Area has been the subject of several cultural resources investigations over the past twenty years. In 1982, the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER), a branch of the National Park Service (NPS), worked with the Army to inventory built resources on Army Materiel Command installations, then known as U.S. Army Development and Readiness Command (DARCOM). During summer 1982, the built resources constructed before 1945 at Edgewood Arsenal were investigated and evaluated within military, regional, and installation historic contexts (Grandine et al. 1982). The surveyors identified the World War I and World War II industrial plants as potentially significant, but recommended additional research to determine specific historical significance (Grandine et al. 1982). The utilitarian support buildings and structures were evaluated as not possessing the qualities of significance.

The buildings in the Edgewood Arsenal Industrial Area were re-surveyed in 1992 during the development of a cultural resources management plan (CRMP) for APG. During this process, historic contexts for the installation were revised and updated and an architectural reconnaissance survey was conducted on buildings constructed before 1951 (36 CFR 60.4 (a-d)) (Goodwin et al. 1993, 1996). The CRMP contained recommendations that the Edgewood Arsenal

MARYLAND HISTORICAL TRUST REVIEW

Eligibility recommended ____ **Eligibility not recommended** X

Criteria: ___A ___B ___C ___D **Considerations:** ___A ___B ___C ___D ___E ___F ___G ___None

Comments: Not eligible as district. Some individual buildings are or may be eligible.

Jonathan Sager — 6/12/07

Reviewer, Office of Preservation Services — **Date**

NA

Reviewer, NR program — **Date**

200701304

Industrial Area be evaluated as a possible district for its historical associations with World Wars I and II (National Register Criterion A). Many of the large industrial buildings were classified as "need more information" because detailed building histories were not compiled as part of the reconnaissance architectural survey. Utility buildings and support buildings generally were evaluated individually as "not eligible" for National Register listing (Goodwin et al. 1996).

Since 1996, the APG CRM has completed Maryland Inventory of Historic Properties forms to document several individual industrial buildings prior to demolition in accordance with on-going consultations with the Maryland Historical Trust. Other buildings have been the subjects of a variety of CRM studies. In general, consultants conducting the survey and evaluation studies in the industrial area have concluded that individual buildings are not individually eligible for National Register listing, though a few buildings have been previously evaluated as possessing the qualities for individual listing in the National Register of Historic Places in consultation with the Maryland Historical Trust as the results of Section 106 undertakings. These buildings are E5188 (HA-1852), a miscellaneous shell filling plant; Building E5325, a chlorine liquefication plant; Buildings E5440 (HA-2095) and E5452 (HA-2096), two mustard gas plant buildings; and, Building E5380 (HA-1993), a production plant for chloracetophenone (CN), a strong tearing agent. All of these buildings have been documented individually on Maryland Inventory of Historic Properties forms and determination of eligibility forms according to MHT standards. However, the question of whether or not the Edgewood Arsenal Industrial Area is a district has remained unresolved (Robinson & Associates, Inc. 1995, 1996).

Edgewood Arsenal has a significant historical association with events that have shaped the broad patterns of U.S. military history during the first half of the twentieth century (1917-1945) (National Register Criterion A). Edgewood Arsenal was established in 1917 as the first chemical weapons manufacturing installation in the United States, and it was the primary manufacturer of chemical weapons during World War I. The installation was owned and operated by the U.S. Army because of the experimental nature of chemical production and weapons manufacturing. Edgewood Arsenal remained the center of development and manufacturing of chemical agents and weapons and protective equipment until 1942, when three larger chemical manufacturing arsenals were constructed to meet the requirements for expanded production during World War II. After 1942, Edgewood Arsenal no longer functioned as the primary chemical weapons manufacturing plant for the U.S. Army. After 1945, the industrial plants in the Edgewood Arsenal Industrial Area were placed on standby status and eventually dismantled. During the Cold War era, the main focus of the installation was on research and development and the Edgewood Arsenal Industrial Area played only a minor role in the installation's history.

Although Edgewood Arsenal is associated with a significant theme in twentieth-century U.S. military history, the surviving buildings and structures in the Edgewood Arsenal Industrial Area, both individually and collectively, no longer possess integrity and specific important associations necessary to illustrate that historic context. Rather than illustrating the progressive evolution of chemical warfare production, the buildings and structures represent a disjointed assemblage of industrial buildings that reflect expedient design without cohesion in plan. Of the over 275 buildings in the industrial area constructed during World War I, only 36 buildings remain. In the shell filling area, shell filling plants # 1, 2, and 3 that dominated the industrial landscape are no longer extant. The remaining ten World War I-era buildings in this area are generally support buildings that only served a minor support role to the shell filling plants; these buildings comprise compressor houses (Buildings E5108 and E5137), the shell dumps (Buildings E5158, E5165, and E5179) where finished shells were tested for leaks and painted prior to shipment, a foundry (Building E5005), and two support shops. Building E5141 was constructed as a hand-grenade filling plant and Building E5265 was not completed when the Armistice ending World War I was signed on 11 November 1918. In the chemical area, ten dispersed industrial buildings remain from World War I, including two mustard gas plants (Buildings E5440 and E5452), three phosgene mixing buildings (Buildings E5352, E5354, and E5360), the chlorine liquefication plant (Building E5325), the sulphur chloride still building (Building E5560), an acid concentrator building (Building E5317), a compressor house (Building E5357), and a car filling building (Building E5427). These buildings do not represent complete chemical production complexes, but are isolated unconnected buildings associated with three

different chemical production lines. Some buildings were not active during World War I or barely in production by the time the war ended. No evidence of the industrial processes remains in the industrial buildings. The extant chemical production buildings are dispersed over a wide area that once was a dense industrial landscape linked by railroad lines, steam lines, and pipes. The overall industrial character of the chemical area has been compromised by the subsequent removal of buildings, railroad lines, and steam pipes. The other extant World War I buildings were minor storage buildings and utilities that supported the original industrial purpose of the installation. As a whole, the buildings dating from World War I do not illustrate, either individually or as a collection of buildings, the industrial plant of Edgewood Arsenal as it existed during World War I.

The role of Edgewood Arsenal shifted dramatically during World War II. Edgewood Arsenal began the war as the primary chemical production arsenal in the U.S. Army inventory and, by 1943, it was the smallest arsenal of CWS's four chemical production arsenals. Of the 52 World War II buildings remaining in the Edgewood Arsenal Industrial Area, 15 are industrial buildings, most of which functioned as self-contained shell filling buildings, sited independently from each other. The primary chemical production buildings active during World War II are no longer extant. Only two buildings (Buildings E5188 and E5380) were documented as retaining pieces of equipment associated with World War II activities (Grandine and Armstrong 1997). The highest numbers of World War II buildings in the Edgewood Area Industrial Area are storage buildings (n=19) and utility buildings (n=14), which were support buildings to the major industrial activities that occurred on the installation. As a collection of buildings, the buildings constructed between 1940 and 1945 do not convey the industrial plant as it functioned during World War II.

The World War I and II buildings and structures are not significant individually or as a group for their physical design or construction applying National Register Criterion C. The industrial buildings often were designed to house chemical-specific processes, but then were adapted to suit production schedules and changing munitions requirements. The original purpose of each building is not inherent in its exterior design or appearance. The buildings have been adapted to other purposes many times since their construction and no longer reflect the industrial processes that the buildings once contained. No original equipment is located in the buildings. The construction techniques visible in these buildings were typical of military construction during their construction eras, using widely-available materials. Overall the buildings in the Edgewood Arsenal Industrial Area are functional buildings that lack ornamentation and do not embody distinctive characteristics of a type, period, or method of construction, represent the work or a master, or possess high artistic value under National Register Criterion C. The extant individual buildings in the Edgewood Arsenal Industrial Area no longer illustrate or exemplify the chemical weapons manufacturing history of Edgewood Arsenal under National Register Criterion C.

The Edgewood Arsenal Industrial Area retains minimal integrity as a district to illustrate the chemical weapons production activities that occurred on the installation during World Wars I and II. The industrial landscape as planned during World War I was substantially altered by the activities that occurred on the installation during World War II. Major industrial buildings were removed and other buildings constructed to accommodate changing production technology. The overall design of the World War I industrial landscape was modified by World War II construction, and the resulting industrial landscape was reshaped following World War II to meet military objectives of the Cold War era. The overall industrial landscape has been compromised by the removal of building complexes and elements that linked the buildings. Examples of complexes of production buildings that have been demolished include the mustard gas plant active in World Wars I and II, the phosgene plant active in World Wars I and II, the World War I chlorine plant, the World War II chlorine plant, and the World War II clothing impregnation plant. The overall landscape no longer retains integrity to illustrate the dense industrial development that characterized the Edgewood Arsenal Industrial Area during its period of significance from 1917-1945.

The Edgewood Arsenal Industrial Area has no known associations with the lives of significant people under Criterion B. It is not anticipated that the complex will yield archeological information important to military activities between 1917 and 1989 under Criterion D.

MARYLAND HISTORICAL TRUST
NR-ELIBILITY REVIEW FORM

Continuation Sheet No. 3 HA-2069

Prepared by: Katherine Grandine, R. Christopher Goodwin & Associates, Inc.

Date Prepared: October 2005

CAPSULE SUMMARY
Edgewood Arsenal Industrial ~~Area~~ Survey District
MIHP # HA-2069
Edgewood vicinity
Harford County, Maryland
1917
Public

Edgewood Arsenal is sited on Gunpowder Neck in Harford County, Maryland. Edgewood Arsenal was founded in 1917 as the first chemical warfare production facility in the United States. It was established in response to the appearance of toxic gas weapons on the European battlefields. Because commercial chemical companies were reluctant to invest in such weapons, the U.S. government decided to build its own industrial production plant. Edgewood Arsenal remained the only government-owned and operated chemical warfare installation in the U.S. until World War II, when three other government-owned chemical warfare production arsenals were established. Edgewood Arsenal continued as the headquarters of the expanded chemical warfare program and the center for specialized and experimental tasks (Cannan et al. 1996). Although established as a separate installation, Edgewood Arsenal currently is known as Edgewood Area of nearby Aberdeen Proving Ground. The two installations were joined administratively in 1971.

The purpose of this MIHP form is to evaluate buildings contained in the Edgewood Arsenal Industrial Area (E5000 blocks), both individually and as a district, applying the National Register Criteria for Evaluation (36 CFR 60.4 (a-d)). Edgewood Arsenal has a significant association with events that have shaped the broad patterns of U.S. military history during the first half of the twentieth century (1917-1945) (National Register Criterion A). However, the surviving buildings and structures in the Edgewood Arsenal Industrial Area, both individually and collectively, no longer retain sufficient integrity to convey specific important associations necessary to illustrate that historic context. Rather than illustrating the progressive evolution of chemical warfare production, the buildings in the Edgewood Arsenal Industrial Area read as a disjointed assemblage of industrial buildings that reflect expedient design without cohesion in plan.

The World War I and II buildings and structures are not significant individually or as a group for their physical design or construction applying National Register Criterion C. The industrial buildings often were designed to

house chemical-specific processes, but then were adapted to suit production schedules and changing munitions requirements. The original purpose of each building is not inherent in its exterior design or appearance. The buildings have been adapted to other purposes many times since their construction and no longer reflect the industrial processes that the buildings once contained. No original equipment is located in the buildings to illustrate historical industrial processes.

The Edgewood Arsenal Industrial Area retains minimal integrity as a district illustrating the chemical weapons production activities that occurred on the installation during World Wars I and II. The industrial landscape as planned during World War I was substantially altered by the activities that occurred on the installation during World War II. Major industrial buildings were removed and other buildings were constructed to accommodate changing production technology. The overall design of the World War I industrial landscape was modified by World War II construction, and the resulting industrial landscape was reshaped following World War II to meet military objectives of the Cold War era. The overall industrial landscape has been compromised by the removal of building complexes and elements that linked the buildings. Examples of complexes of production buildings that have been demolished include the mustard gas plant active in World Wars I and II, the phosgene plant active in World Wars I and II; the World War I chlorine plant, the World War II chlorine plant, and the World War II clothing impregnation plant. The overall landscape no longer retains integrity to illustrate the dense industrial development that characterized the shell filling and chemical production areas during World Wars I and II.

Maryland Historical Trust
Maryland Inventory of
Historic Properties Form

Inventory No. HA-2069

1. Name of Property (indicate preferred name)

historic	Edgewood Arsenal Industrial ~~Area~~ Survey District
other	

2. Location

street and number	Edgewood Area, Aberdeen Proving Ground	X not for publication
city, town	Edgewood, MD	X vicinity
county	Harford	

3. Owner of Property (give names and mailing addresses of all owners)

name	U.S. Army Garrison, APG, Department of the Army, DoD				
street and number	2201 Aberdeen Blvd			telephone	410-278-6756
city, town	APG	state	MD	zip code	21005

4. Location of Legal Description

courthouse, registry of deeds, etc.	Harford County Courthouse			liber	folio
city, town	Bel Air	tax map	tax parcel		tax ID number

5. Primary Location of Additional Data

_____ Contributing Resource in National Register District
_____ Contributing Resource in Local Historic District
__X__ Determined Eligible for the National Register/Maryland Register
_____ Determined Ineligible for the National Register/Maryland Register
__X__ Recorded by HABS/HAER
_____ Historic Structure Report or Research Report at MHT
_____ Other:_____

6. Classification

Category
__x__ district
_____ building(s)
_____ structure
_____ site
_____ object

Ownership
__x__ public
_____ private
_____ both

Current Function
_____ agriculture
_____ commerce/trade
__x__ defense
_____ domestic
_____ education
_____ funerary
_____ government
_____ health care
_____ industry
_____ landscape
_____ recreation/culture
_____ religion
_____ social
_____ transportation
_____ work in progress
_____ unknown
_____ vacant/not in use
_____ other:

Resource Count

Contributing	Noncontributing	
5	105	buildings
		sites
	20	structures
		objects
5	125	Total

Number of Contributing Resources previously listed in the Inventory
9

7. Description

Inventory No. HA-2069

Condition

___ excellent ___ deteriorated
_x_ good ___ ruins
___ fair ___ altered

Prepare both a one paragraph summary and a comprehensive description of the resource and its various elements as it exists today.

RESOURCES COUNT = 130

Edgewood Arsenal historically was designed as a shell filling and chemical production plant during World War I. The Edgewood Arsenal Industrial Area is the historic core of industrial operations. During World War I, the industrial core was organized into two distinct geographic areas: the shell filling plant in the center of the installation and the chemical production area located south and west of the shell filling plant. During World War II, Edgewood Arsenal shared the industrial operations of chemical production and shell filling with three additional Chemical Warfare Service (CWS) arsenals. Mass production of chemicals for warfare occurred at the three additional arsenals, while industrial activity at Edgewood Arsenal evolved into completing special orders, experimenting with new processes, and supporting research and development activities that grew to dominate the arsenal activities during World War II. The Edgewood Arsenal Industrial Area retained the geographic distinctions between the shell filling area and chemical production, but these geographic delineations shifted between World Wars I and II. During World War II, shell filling operations were shifted westward of the location of the World War I shell filling plant to an area west of Hoadley Road and north of the chemical production area. The buildings in the former World War I shell filling area were removed or adapted to administrative uses, support activities, shops and utilities. After World War II, industrial production and shell filling plants were placed on standby. As the Cold War era unfolded, industrial production at Edgewood Arsenal was minimal as research and development activities increased.

The Edgewood Arsenal Industrial Area (HA-2069) currently contains 130 buildings and structures. Of these, 36 buildings and structures remain from World War I (1917-1918), when the initial installation comprising over 250 buildings was constructed. The buildings are dispersed throughout the industrial area. Twenty buildings are classified as industrial, including ten buildings associated with chemical production and ten buildings associated with the shell filling plant. The buildings do not represent complete chemical production lines, but are isolated remnants from larger chemical production complexes that produced a variety of chemicals. The World War I-era buildings located in the shell filling area include two compressor houses that supported shell filling plants no longer extant, three shell dumps where shells were tested for leaks and painted prior to shipment, a foundry, two small individual shell filling buildings, and two shops. No buildings from the operating shell filling plants remain extant. The other building types from World War I include storage buildings (n=10), administration buildings (n=4), and utilities (n=2).

The second wave of major construction at Edgewood Arsenal occurred during World War II (1941-1945) when the number of buildings on the installation increased to 1,269. Remaining World War II buildings in the Edgewood Arsenal Industrial Area number 52 and comprise 15 industrial buildings and structures, 19 storage buildings, 14 utility buildings and structures, 2 administration buildings, 1 research building, and 1 miscellaneous building. Few buildings were constructed in the industrial area during the Inter-War (n=14) and the Cold War (n=14) eras. Since 1989, 13 buildings were added in this area. The post-1989 buildings are generally small support and storage buildings.

The buildings constructed in the Edgewood Arsenal Industrial Area are industrial in character and generally lack architectural ornamentation. The building designs and materials are functional. In general, the buildings are one story. Construction materials include structural clay tile, corrugated transite, corrugated metal, and concrete block. Openings contain simple window and door units. Building E5101, constructed in 1942 as the Arsenal Headquarters Building, is the only building with architectural ornamentation; its design incorporated some elements that reflect a stripped Moderne style.

Historical records indicated that the external appearance of the industrial buildings was unrelated to the technological processes housed inside the buildings. In other words, internal production processes did not define external architectural

designs. Individual building histories revealed that, in many cases, the buildings actually were not used for the purposes for which they were designed and built. The technological processes changed during the actual construction of the building, or the production needs changed dramatically. Buildings constructed to manufacture mustard gas, for example, were quickly adapted to produce different chemicals. Some buildings constructed in 1918 were not operational by the time World War I ended. In times of war, the technological processes changed so dramatically that buildings were continuously altered over time to accommodate new equipment and safety upgrades. After World War I ended, most of the buildings that were constructed with temporary materials were rebuilt with permanent construction materials. Only two buildings (E5188 and E5380) constructed during World War II were documented as containing a few pieces of equipment to illustrate the industrial processes that occurred at Edgewood Arsenal from 1918 through 1945 (Grandine and Armstrong 1997). No other equipment illustrating the production processes survives in any of the buildings in the Edgewood Arsenal Industrial Area. The continual adaptation of the buildings in the industrial area to changing technologies and new uses has compromised the integrity of individual buildings to convey their associations with significant events in U.S. history.

The physical integrity of the Edgewood Arsenal Industrial Area as an industrial landscape has been compromised through changes over time. The industrial processes historically occurred in dense complexes that required many support buildings and structures. Support structures included scrubbing towers, above-ground chemical storage tanks, and above-ground steam pipes and pipes to transport chemicals. The building density of the industrial area has been compromised by the removal of building complexes and elements that linked the buildings. Examples of complexes of production buildings that have been demolished include the mustard gas plant active in World Wars I and II, the phosgene plant active in World Wars I and II, the World War I chlorine plant, the World War II chlorine plant, and the World War II clothing impregnation plant. In addition, most of the support structures and railroad tracks that once linked the buildings to transport raw materials and finished products have been removed, erasing the linkages that once existed between the chemical production and shell filling areas. The overall landscape no longer retains sufficient integrity to illustrate the dense industrial development that characterized the shell filling and chemical production areas during World Wars I and II.

METHODS

This Maryland Inventory of Historic Properties form presents the results of archival research and field survey for the Edgewood Arsenal Industrial Area at Aberdeen Proving Ground, Maryland. The study was undertaken for the purpose of evaluating the buildings individually and as a district applying the National Register Criteria for Evaluation.

Archival research and field survey were conducted concurrently between October 2004 and June 2005. Archival research was conducted at the Historical Office of the U.S. Army Soldier and Biological Chemical Command (Building E5027), at the Directorate of Installation Operations (DIO) at APG, and in the files and reports maintained by the APG Cultural Resources Manager (CRM). Research included examination of individual building files, completion reports from World War I, documents from World War II, CRM studies and reports, HABS documentation, and published secondary sources. In addition, real property records and selected drawings located at DIO were examined.

The architectural field survey focused on buildings and structures located in the former industrial core of Edgewood Arsenal. The list of built resources included in the survey was compiled from the 1996 CRMP (Goodwin & Associates 1996) and the current Historic Building List maintained by the APG CRM. Field investigations were conducted on the exteriors of all buildings in the industrial area to collect data on character-defining features and construction materials and to assess building integrity. All photography was completed by the APG CRM.

The current building numbering system designates all buildings located in Edgewood Area with the prefix "E." The current numbering system dates from 1962. In general, the E5100 block was the location of the World War I shell filling plants (no longer extant). A few administrative buildings also were located in the E5100 block. The buildings involved in chemical production generally occupied the E5300 and E5400 blocks. Utility and storage buildings were constructed throughout the area as needed and where space was available.

The following descriptions generally are organized chronologically, then by property type. In cases where groups of buildings are associated with a single plant or activity, they are described together.

WORLD WAR I (1918-1919)

Administration

Building E5183 was constructed as the central guardhouse between August and October 1918. The two-story building measures approximately 40 (two bays) x 128 (thirteen bays) feet and has a concrete foundation and structural clay tile walls. The historic exterior finish was cement plaster stucco. The gable roof is sheathed with composition roll roofing. Historically, the building had asymmetrical fenestration containing six-over-six-light, wood-frame, double-hung sash windows with brick quoining and brick lintels and sills. Doorways contained wood-panel single doors that were accessed by a one-story veranda that spanned the north elevation. All of these elements were removed in subsequent renovations. The current exterior walls and window surrounds are covered in Dryvitt, the windows and doors are replacement units, and the veranda has been removed. A modern one-bay gabled porch now shelters the main entry on the front (north) elevation. The building originally was designed to house 100 guards and 35 prisoners. By 1920, space in the building was assigned to the museum for gas warfare and records storage. By 1937, the building was adapted as Chemical Laboratory # 2. In 1942-1943, the building was extensively renovated into offices for the Inspection Division. It has remained administrative offices since then. During the 1990s, the building was extensively renovated, at which time Dryvitt was applied to the exterior walls and the windows and doors were altered (Marshall and Ellicott 1919b:135-137; EAI Corporation, Building E5183; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files; HABS 1982). The 1990s renovation compromised the building's integrity of design, materials, or workmanship to illustrate World War I construction.

Building E5180 was the fire-engine house constructed between August and October 1918. The building originally was one story and measured approximately 30 x 48 feet. The building rested on a concrete foundation and had structural clay tile walls. Two original doorways on the east elevation contained paired hinged wood doors to accommodate fire equipment. In early 1939, the building was extensively expanded. A second story was added to the building to provide sleeping quarters and to expand truck space on the first floor (Marshall and Ellicott 1919b:145-146; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). In 1982, the building measured 60 (five bay front) x 30 feet with a wing that measured 25 x 15 feet and a six-foot square tower (HABS 1982). Alterations to the fire engine house that occurred during the 1990s included the construction of a large one-story, parged, concrete-block addition with four garage bays to house the fire engines. The new addition required the removal of the tower and incorporated one bay of the older firehouse. In ca. 1998, a second story clad with vinyl siding was added over the garage to upgrade living quarters for the firemen. In general, the recent expansions have engulfed the older firehouse so that the building no longer retains integrity of design, materials, or workmanship.

Shell Filling Plant Area
The shell filling plant area occupied the center of the installation. It is approximately bounded by Fleming Road on the east, Hoadley Road on the west, Blackhawk Road on the north, and Noble Road on the south. No operational shell filling plants from World War I remain extant.

Building E5141 was constructed between May and June 1918 as a hand grenade filling building (Marshall and Ellicott 1919b:41-43). The one-story building measures approximately 75 (6 bays) x 41 (2 bays) feet. The foundation is concrete while the walls are constructed of structural clay tile. The hipped roof is sheathed with composition roll roofing, which replaced the original tarpaper. Two prominent metal vents project from the roof. The roof overhangs all elevations and is supported by simple wood brackets. The original doorways were located in the north and south (short) elevations. Paired metal doors are located in the west (front) elevation. The windows are multi-light replacement units. The building originally contained equipment to fill hand grenades with stannic chloride. The building was used as an experimental laboratory during the early 1920s. From the late 1920s until World War II, production of gas mask filters and research on gas mask face pieces and protective devices occurred in the building. After 1946, the building was renovated to accommodate administrative uses (EAI Corporation, Building E5141). Renovations to the building since 1996 have included the application of Dryvitt to the exterior walls and replacement of all windows and doors so that the building no longer retains integrity of design, materials, or workmanship.

Building E5108 was begun in 1918 as the compressor house for shell filling plant # 3, the 75mm shell filling plant. The building remained incomplete at the time of the Armistice; about 75 percent of the machinery and piping was installed (Marshall and Ellicott 1919b:97-98). The one-story building measures approximately 42 (3 bays) x 101 (6 bays) feet and has a two-bay by two-bay rear wing to form an L-shaped footprint. The foundation is a concrete slab. The building has a steel frame with walls and roof finished with concrete on hy-rib. A central doorway is contained in a one-bay projecting vestibule on the west (front) elevation. The vestibule has paired wood doors with four lights. The vestibule is flanked by metal-sash, multi-light, industrial sash windows. The rear (east) elevation contains paired metal doors with lights. A band of wood-frame, sixteen-light pivot windows is located at the eave along the east elevation. The north and south elevations contain five-light windows. The building currently is vacant.

Building E5265 was originally designed in 1918 for filling 8-inch and 9.2-inch shell with mustard gas and was adjacent to shell filling plant # 2, the 155mm shell filling plant. Construction of the building was started on 5 November 1918; the building remained incomplete in December 1918 due to the end of World War I. The completed portions were the concrete foundations, the structural steel frame, the wood roof, and the steel door frames. The walls and floor were not completed (Marshall and Ellicott 1919b:87). The earliest uses of Building E5265 remain undocumented. Between 1931 and August 1941, the building was used as a quartermaster garage and carpentry shop for Fort Hoyle that occupied the southern portion of Edgewood Arsenal. In September 1941, the building was taken over by the Production Division as an incendiary bomb filling plant. Approximately 50,000 incendiary units were filled in this building during its brief operation. The incendiary ANM 54-type bombs dropped by Brig. Gen. James Doolittle and his airmen on Tokyo, Japan, in April 1942 were manufactured in this building (CWS Newsletter 1942). In August 1942, the building was remodeled to house smoke filling operations, primarily with hexachloroethane (HC). The production capacity of the building was 5,500 105mm canisters filled with HC; 2,500 smoke pots; 3,000 76mm shell filled with HC; and 3,000 grenades per 24-hour period. Between 1943 and 1945, production accomplished in this building included 1,080,552 canisters with HC; 791,051 smoke pots; 279,223 M77 bombs with HC; 19,180 60mm shell with HC; 86,434 2.36-inch rockets with HC; 176,901 M8 grenades with HC;

25,200 rifle grenades with HC; and, 18,514 colored grenades (Edgewood Arsenal Plant Status 1946). Since World War II, the majority of work undertaken in the building has been with colored smoke mixtures (EAI Corporation, Building E5265; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). In 1997, the earliest equipment identified in the building dated from the 1950s (Grandine and Armstrong 1997).

Building E5265 is a one-story building that measures approximately 192 (8 bays) x 115 (1 bay) feet with a low, one-story addition on the south end. The exterior walls are constructed of structural clay tile and rest on a concrete foundation. The monitor roof has bands of multi-light windows. The west elevation has two metal overhead roll doors and five pairs of solid metal doors. A wide, one-story open shed addition spans the east elevation of the building. The building has been continually renovated since its original completion. In 1958, new steel sash windows and doors were installed in the building (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files).

Building E5267 is a one-story building that measures approximately 23 (3 bays) x 11 (1 bay) feet. The building is constructed of structural clay tile and has a shed roof with an overhang along the front (east) elevation supported by wood posts. The roof overhang shelters a concrete loading platform. A metal door occupies the center of the east elevation. In the APG real property records, the building is assigned a construction date of 1918, although it does not appear in the 1919 completion report or on the 1919 map (Marshall and Ellicott 1919; Edgewood Arsenal 1919; APG real property records).

Building E5269 is a small storage building located northeast of Building E5265. The one-story, structural clay tile building measures 13 (2 bays) x 11 (1 bay) feet. It has a shed roof. Two metal doors with single lights occupy the east (front) elevation. The building was constructed in 1942 as the first-fix mixing building associated with the manufacture of incendiary munitions in Building E5265 (HABS 1982; EAI Corporation, Inc. Building E5269; APG real property records).

Shell Dumps

Buildings E5158, E5165, and E5179 are shell dumps constructed between January and July 1918 to house the leak testing and painting department. In these buildings, shells were finished prior to shipment to storage or to end users. Each shell dump comprised two separate buildings, a receiving shell dump and a shipping shell dump (Marshall and Ellicott 1919a:16). The shells were tested for leakage in the receiving shell dumps by storing each shell nose-down for 24 hours. The shells were painted and finished in the shipping shell dumps. In general, all three shell dump buildings exhibit the effects of continuous renovations since their construction.

Building E5165 was constructed between January and May 1918 and was the only one of the three shell dumps operational by Armistice Day (Marshall and Ellicott 1919b:25-28, 78-79, 100-101). The original design of the shell dumps incorporated heavy timber construction on a raised foundation constructed of reinforced concrete beams and girders. After the foundation was poured, the superstructure was altered to a structural-steel frame with corrugated iron siding to make the building fireproof. The wall construction was described as 8-inch concrete curtain wall between the exterior columns (Marshall and Ellicott 1919b:101). Building E5165 currently is clad with corrugated transite (HABS 1982; EAI Corporation, Building E5179). The one-story building measures approximately 61 x 419 feet with a wing that projects from the northeast corner and measures approximately 62 x 79 feet. The building occupies an L-shaped footprint. Each section of the building has a shed monitor roof; the shed roofs on either side of the monitor currently exhibit built-up roofing. The original roof was described as constructed of hy-rib concrete. The monitor contains bands of six-light, metal-frame fixed windows that

replaced the original individual, wood-frame, multi-light units. Industrial sash windows are located along the eave of the east and west (long side) elevations. The east and west elevations contain multiple doorways. A single modern metal door occupies the north elevation; the doorway is set under a gable hood roof. A single metal door occupies the west elevation near the northwest corner of the building. This doorway is accessed from a concrete loading dock sheltered under a shed roof supported on metal poles. The east elevation of the wing contains two single doors and two sets of paired doors that open onto a narrow concrete loading dock sheltered under an eave that projects from the roof. Originally this elevation contained wood sliding doors. When Building E5165 was completed, it contained four conveyor belts to move shells through the building, seven buffing machines, and eight paint spray guns (Marshall and Ellicott 1919b:25-28). By 1937, the building housed a field office for inspectors. It was assigned to the proof and surveillance branch in 1947 (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). The receiving shell dump originally associated with Building E5165 is no longer standing.

Buildings E5158 and E5179 (HA-1963) are similar in design to Building E5165. Construction of Building E5179 began in March and was completed in July 1918. Machinery was only partially installed in the building by Armistice Day (Marshall and Ellicott 1919b:78-79; Ewing and Robinson 1996). Building E5158 was begun in April and finished in November 1918; no machinery was installed in the building by Armistice Day (Marshall and Ellicott 1919b:100-101). The buildings were operational by 1921 (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). The construction of both buildings differed from Building E5165 in that the foundations were 4-inch reinforced concrete slab on steel beams and girders and the exterior walls were described as constructed of 8-inch tile between the exterior steel columns (Marshall and Ellicott 1919b:100-101). The exteriors of both buildings currently are clad in transite. The buildings have shed monitor roofs fitted with fixed, multi-light windows.

In 1938 and 1947, Building E5179 was used as a storehouse for the Ordnance Department. By 1962, the building was used for general storage. During the 1980s, Building E5179 was extended at the northwest corner to provide additional floor space and to join it to former Building E5178 (EAI Corporation, Building E5179). An open concrete loading dock on a raised concrete foundation was added to the extension. Recent alterations to Building E5179 include the construction of two loading docks to the east elevation of the building. The concrete loading docks are sheltered under projecting, asphalt-shingled, gable roofs with modern metal overhead roll doors (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files).

Building E5158 was operational by 1924, when it was equipped for use by the Ordnance Department as an assembly plant to complete rounds of chemical shells with fixed ammunition. Prior to World War II, the building was used as a grenade assembly plant. The building housed this function until 1942, when the U.S. Army Ordnance Assembly Plant was completed on the west side of the installation. Between 1942 and early 1945, Building E5158 housed lines to paint and assemble smoke pots, tear pots, chemical grenades of all kinds, and miscellaneous items of munitions. These items had no fuses in them. In late spring 1945, the Ordnance Department added an ordnance assembly line in the building in which igniter fuses were added to the grenades. Just before 3:30 pm on 25 May 1945, the grenade line in the building exploded, killing 12 women and seriously injuring 21 other women employees. The explosion demolished interior retaining walls; blew out windows, doors, and roof; and, started a fire. This was the worst single accident at Edgewood Arsenal. Between 1949 and 1964, Building E5158 was designated as a miscellaneous munitions assembly and packing plant. In 1965, the building was converted into shop facilities (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files; Grandine 2004; APG News 27 March 2003).

Buildings E5178 and E5158 both retain former receiving shell dump buildings. Originally the receiving shell dumps were separate buildings, but they have been incorporated into the larger buildings. The receiving shell dump associated with Building E5178 extends along the west elevation of Building E5179, while the receiving shell dump associated with Building E5158 extends along its east elevation. The receiving shell dump attached to Building E5178 is one story and one-bay wide by 23-bays long. It has a raised concrete beam foundation, metal frame, and corrugated transite walls and roof. The gable roof extends along the side elevation to shelter a narrow concrete loading platform. Window bays that contain triple, six-light, metal-frame windows alternate with doorways along the west elevation. The doorways contain a variety of door types, including sliding wood doors, sliding metal doors, single doors, and overhead roll doors. A railroad track was once located along the west side of the building. The south and east elevations of the receiving shell dump are blind.

Chemical Plant Area

The World War I Chemical Plant Area was located west of the Shell Filling Plant Area. This area is bounded by Hoadley Road on the east, Hanlon Road on the north, and canal creek on the west and south.

Phosgene Plant

Buildings E5354, E5352, and E5360 originally were constructed as four mixer buildings for the production of phosgene, a lung irritant made from mixing chlorine and carbon monoxide. The buildings were constructed between February and July 1918. Building E5352 was fully equipped and operational by 12 May 1918 and apparently entered production. Building E5354 was completed in May 1918, but the equipment was not operational. Building E5360 originally was two separate buildings that were subsequently joined (Edgewood Arsenal 1941). The east half of the building was fully equipped and ready for operation by August 1918, while equipment was not yet installed in the west half of the building by the time World War I ended (Marshall and Ellicott 1919c:4-9) The four mixer buildings were identical in design and erected by the Lackawanna Bridge Co. Each building measured 120 (6 bays) x 75 (3 bays) feet. The one-story phosgene mixer buildings were constructed of steel frames resting on concrete foundations. The exterior walls were clad with corrugated metal siding. Each building had a monitor roof with wood-frame windows. The doors were wood and the windows were wood sash with clear lights. The buildings were equipped with catalyzer boxes where the chlorine and carbon monoxide were combined to form phosgene (Marshall and Ellicott 1919c:4-9). The buildings retained their exterior corrugated metal siding through 1921 (Laird and Scott 1921). After World War I, the phosgene mixing buildings were placed on standby and were not used in the production of phosgene during World War II. The World War II phosgene production plant (no longer extant) was located north of Hanlon Road.

Buildings E5354, E5352, and E5360 exhibit continuous alterations over time, which have compromised their integrity of materials and design. The exterior appearance of Building E5352 dates from 1938 when the building was renovated with a new roof and new windows and doors. Building E5352 is clad with corrugated transite. Large metal-frame industrial sash windows are located in all elevations. Bands of six-light windows occupy the monitor roof. The doors are paired metal units with lights. Single metal overhead track doors occupy the south elevation and the east end. Documented uses of the building after World War I include storage for store bar and sheet iron and steel beginning in 1928. In May 1941, Building E5352 was converted from storage to a DM assembly plant that operated between May 1941 and October 1943. Subsequent uses of Building E5352 included filling M47-A7 bombs with napalm and frangible grenades with jellied gasoline.

Building E5354 was used for chemical storage during the 1920s. Between 1933 and 1941, it served as the officers' gymnasium. In 1942, Building E5354 was converted into a DM candle manufacturing and assembly plant. At the end of 1942, the building was converted to manufacture gas identification kits ("History of Edgewood Arsenal" ca. 1945). Its capacity was to produce 2,000 CN capsules per person in eight hours and 450 identification sets per 24-hour period. By 1945, production accomplished in the building included: 4,422,261 CN capsules; 756 H vapor detection kits; 51,062 detonation sets; 25,243 instruction sets; 526,932 detonation set tubes; and, 30,874 replacement instruction sets. Building E5354 was the only building of the complex listed in active production in the 1946 Plant Status Report. Since 1965, the building has been used as a maintenance shop (EAI Corporation, Building E5354; Edgewood Arsenal Plant Status 1946). During the 1990s, modern metal siding was installed on the north, west, and south elevations of Building E5354. The industrial sash windows on the north, west, and south elevations were replaced with a few modern fixed units. Corrugated transite siding and industrial sash windows are retained on the east elevation. A metal overhead roll door occupies the south elevation. A single metal door is located in the west end.

The exterior of Building E5360 exhibits post World War II alterations (Edgewood Arsenal 1942). Building E5360 has concrete-block-exterior walls that define the bays. The bays are spanned with industrial sash windows and particle board panels along the upper wall. The windows have concrete slip sills. The long (north and south) elevations have multiple doorways that contain single units, paired metal units, and two large metal overhead track doors. A low, one-story, concrete-block addition spans the east end. This addition has a central bay with parapet that once contained a vehicle bay, which is now enclosed. A one-bay projecting plywood vestibule containing paired wood doors is located near the northeast corner of the addition. Building E5360 was used for storage by 1938, when the building was renovated through the overall replacement of all window sashes and sills and four sets of double doors. During World War II, Building E5360 served as the mechanical shops for the Production Division for reconditioning and manufacturing metal components in shells ("History of Edgewood Arsenal" ca. 1945:548-549). The west end of Building E5360 was equipped with turret lathes to convert 155mm shells to MIIA-1 type. The initial order dated January 1940 for reconditioning shells was over 97,400 shells. By the time the project was completed in 1942, over 760,100 shells had been reconditioned ("History of Edgewood Arsenal ca. 1945:548). The east end of Building E5360 was equipped to recondition and modify 75mm shells. By 1962, Building E5360 continued use as a machine shop (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files).

Building E5357 was constructed between February and June 1918 as the ammonia compressor house located in the middle of the phosgene mixing buildings. The building contained a standard ammonia refrigeration system; it was operational by July 1918. The ammonia system pumped cooled brine to the phosgene liquefying towers and the Levenstein mustard gas reactors (Marshall and Ellicott 1919c:10-11). The building originally was constructed with a steel frame on a concrete foundation and clad with corrugated iron siding with corrugated metal roofing. The one-story building measures approximately 41 (1 bay) x 101 (5 bays) feet. The windows were originally wood-frame, double-hung sash and the original doors were wood. The current exterior materials are corrugated transite siding on the exterior walls and corrugated metal on the gable roof. Metal-frame industrial sash windows occupy all elevations. A single door occupies the east end. A ridged structural clay tile addition is attached on the southwest corner of the building. This addition has a shed roof, a wide metal door with lights, and industrial sash windows. By 1962, this building was used for general storage (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files).

Building E5317 (HA-1992) was constructed between 26 March and 1 June 1918 as an acid concentrator building. This building housed equipment to dry the acid used to dry the primary chemical gases that were combined to form phosgene.

The process of making phosgene required that the chlorine and carbon monoxide gases that made phosgene be absolutely free from water vapor. Prior to mixing phosgene, carbon monoxide was passed through a sulphuric acid spray to remove all water vapor. Building E5317 was apparently used to make the acid used in drying the gases prior to the manufacturing of phosgene. In 1918, Building E5317 was equipped with a furnace and a number of silica basins. The dilute acid was concentrated through a process of passing through the basins. At the end of the process, the acid was piped to a drying house. Building E5317 is one story and measures approximately 45 (3 bays) x 60 (4 bays) feet. It is steel-frame construction on a concrete foundation. In 1918 the external cladding was two inches of cement plaster on metal lath (Marshall and Ellicott 1919c:28-29, 23). The narrow monitor roof originally contained rows of wood-frame sash. The windows in the building were wood-frame, pivot windows and the doors were wood. The current windows are metal-frame industrial sash installed during the 1960s. Currently the doors are paired metal doors. One set of doors is located in the center of the west elevation and one set of doors is located off-center in the south elevation. After World War I, the building was used as storage, then as a research laboratory after World War II. Building E5317 was substantially renovated in 1958; the exterior walls were rebuilt with concrete block. The building's footprint also increased slightly in size. The roof was refitted with cement mortar on hy-rib and covered with composition roofing. Following these alterations, the building's construction date was listed as 1958 on real property records (EAI Corporation, Building E5317). The building currently is vacant.

Mustard Gas Plant

By mid 1918, the U.S. Army required a location to produce mustard gas and added a mustard gas production plant to the chemical production complex at Edgewood Arsenal. Two wings of the original four-wing mustard gas plant are extant. These wings, Buildings E5440 (HA-2095) and E5452 (HA-2096), are essentially identical. The two-story buildings measure approximately 100 (7 bays) x 60 (3 bays) feet. The buildings are constructed of a steel frame infilled with structural clay tile. The exterior is stuccoed and painted. The monitor roof has a continuous band of steel-frame industrial sash windows. The roof is sheathed with asphalt shingles. A continuous band of steel-frame industrial sash windows is located along the eave line in each long elevation. Industrial sash windows also light the first floor. Multiple doorways contain single and paired metal doors with lights.

Building E5452 was the first wing of the mustard gas plant to be completed. Building E5452 was constructed between 14 May and 25 July 1918. However, Building E5440, constructed between 19 May and 2 August, was the first wing to produce mustard gas starting on 3 August 1918. Mustard gas was produced in Building E5440 using French-style reactors until new Levenstein reactors were installed in the south wing (demolished) and in Building E5452, which entered mustard gas production on 1 October 1918. As originally constructed, both buildings had steel frames clad with corrugated iron siding. The original doors were wood units and the windows were wood-frame units (Marshall and Ellicott 1919c:71). By July 1921, the exteriors of both buildings had been rebuilt. The corrugated iron siding was replaced with structural clay tile walls. The buildings still had wood-frame windows and wood doors (Laird and Scott 1921). In 1928, the tarpaper roofs on Buildings E5440 and E5452 were replaced with Flexstone roofing and the windows in the monitor roofs were replaced.

After the end of World War I, the production of mustard gas was consolidated into the south wing of the original plant (demolished). Building E5452 was adapted to the production of brombenzyl cyanide (Laird and Scott 1921) and Building E5440 was adapted to the production of the other chemical agents (EAI, Corporation E5440). In 1941, the buildings were readied for wartime production. During World War II, Buildings E5452 and E5440 operated as filling plants producing tear pots and M7 grenades with chemicals HC and CN. Building E5452 served a variety of uses, including filling land mines with simulated mustard (January-June 1941), filling 75mm shell with CNS and CNB (starting July 1941), and production of

match heads and starter mix for tear pots (October 1943). The World War II production statistics for these buildings are combined. The production capacity in these buildings was 3,600 tear pots and 3,600 grenades per 24-hour period. In all, World War II production in these buildings comprised 785,967 tear pots; 505,618 M7 grenades; 18,840 M25 grenades; 330,016 M6 CN-DM grenades; 45,971 miniature candles filled with HC; and, 307,002 76mm shells filled with HC (Edgewood Arsenal Plant Status 1946). In 1958, new steel sash windows and doors were installed throughout the buildings (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). No equipment was evident during an exterior survey of the buildings in November 2004. Both buildings are vacant.

Building E5427 was constructed between 19 September and 13 November 1918. The building was designed for filling tank cars used to convey mustard gas to the shell filling plant over the internal 21-inch gauge railroad. The one-story building measures overall approximately 66 (5 bays) x 100 (7 bays) feet and the roof is oriented east-west. The original section of the building was the tall center section for filling operations. The cars entered the south elevation of the building. Before completion, the building design was modified to incorporate space to store the tank cars to prevent them from freezing. The tank cars then entered and exited from doorways located in the outer bays of the east and west elevations. Because it was completed on 13 November 1918, the building was not put into operation (Marshall and Ellicott 1919c:100-101). The building rests on a concrete foundation. The center section has concrete walls to a height of 7 feet above the floor. The upper walls of the center section and the outer wing walls are structural clay tile. The roof is sheathed with composition roll roofing (APG real property records). The windows originally were wood-frame, six-over-six-light, double-hung sash units. The building has modern replacement windows throughout; a few windows are metal-sash industrial windows. Some window openings have been infilled with concrete block. The original wood doors were replaced with modern metal units and metal overhead track doors. Beginning in 1937, the building was reconditioned for use as a whetlerite production plant. Whetlerite is a process of impregnating charcoal for use in protective equipment, such as gas masks. The production plant was readied for wartime use in 1941. Between 1941 and 1943, the plant produced 4,677,446 lbs of whetlerite; 52,974 lbs of caustic pumice; and, 4,803 lbs of kupramite (Edgewood Arsenal Plant Status 1946). After the war and throughout the 1950s, the plant was placed on standby. By 1962, the building was used for storage (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). The building was renovated for office space during the late 1990s (APG real property records).

Building E5425 is a one-story, structural clay tile building. It does not appear on 1919 maps of Edgewood Arsenal, nor is it clearly depicted on the 1929 photographic mosaic of the installation (Edgewood Arsenal 1919, 1929). The building measures approximately 66 (7 bays) x 19 (1 bay) feet. Two metal doors with concrete stoops are located on the south elevation. The window openings originally were larger openings accommodating industrial sash windows. The window openings have been partially infilled with concrete block to accommodate modern one-over-one-light units. The gable roof is sheathed with composition roll roofing and has two projecting metal vents. During World War II, the building was used as the riggers building. In 1962, it was used as a maintenance shop (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files).

Building E5441 was constructed in 1918 as a shower and toilet building to support workers in the mustard gas plant (Marshall and Ellicott 1919c:113). The one-story measures approximately 35 (5 bays) x 57 (6 bays) feet. The exterior walls are constructed of structural clay tile and stuccoed. Doorways contain five-panel wood doors and the windows are wood-frame, six-light units. The shed roof was sheathed with composition roll roofing, but the roof is extremely deteriorated. The building is vacant.

Building E5560, constructed between 24 July and 28 September 1918, was designed as a sulphur chloride still building to distill and purify sulphur monochloride for use in the manufacture of mustard gas. Technical improvements in the processing of sulphur changed during the time the building was under construction, so that equipment was never completely installed. Only four of the anticipated twelve stills were installed in the building. By the end of World War I, the building was not in operation (Marshall and Ellicott 1919c:104-106). As completed, the one-story building measuring approximately 63 (3 bays) x 140 (8 bays) feet was constructed of structural clay tile on a concrete foundation. The original building design had a monitor roof with metal-frame industrial windows. Currently the building has a gable roof sheathed with modern standing-seam metal with a horizontal metal ventilator along the roof ridge. The building originally had tall industrial sash window units installed along the side elevations. Between 1991 and 1998, the building was entirely remodeled to accommodate office space and a laboratory. The exterior walls were refinished with Dryvitt. A small one-story addition was attached to the west end. The windows were replaced with smaller, modern fixed units. A main entry was inserted on the south elevation. This entry contains paired modern metal doors with glass surround in a projecting glass vestibule. Since its construction, the building has been used for a wide variety of uses. In 1928, the building was reconditioned as an impregnating plant for manufacturing whetlerite and charcoal for gas mask canister filling. During the 1930s, the building was a clothing impregnating plant (1933-1939), and it was used as an experimental munitions laboratory and experimental smoke plant during World War II (EAI Corporation, Building E5560; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). This building no longer possesses sufficient integrity of design, materials, workmanship, or feeling to suggest that it was constructed during World War I.

Building E5325 (HA-1993) was constructed as the liquid chlorine plant and is the only remaining building associated with the World War I chlorine plant. The two-story building with monitor roof measures approximately 42 (3 bays) x 77 (4 bays) feet. The building rests on a concrete foundation and has a concrete frame infilled with structural clay tile. The monitor roof is sheathed with composition roll roofing and has a clerestory with nine-light industrial sash windows. Some windows in the clerestory are covered. The outer south wall has a row of eight-light industrial sash windows along the upper wall below the concrete frame. The building has a single metal door with two lights in the east elevation. Paired sliding metal doors with lights occupy the west elevation. The building was constructed between 1 July and September 1918 and readied for operation, but not activated. Its purpose was to provide high strength chlorine to manufacture phosgene gas. At that time, commercial plants typically produced chlorine in a purity range of 75 to 90 percent, while the production of phosgene required at least 95 percent pure chlorine. Building E5325 was designed to purify commercially-purchased chlorine. When the chlorine plant (no longer extant) built at Edgewood Arsenal became operational, it provided 98 percent pure chlorine, so that Building E5325 was not needed. Chlorine was piped directly from the chlorine plant located on the west side of Canal Creek to the phosgene production plants without further purification (Marshall and Ellicott 1919c:62-64). A massive chlorine tower to support the pipes used in compressing chlorine gas once stood along the north side of Building E5325; the tower has since been removed. After World War I, Building E5325 was used for storage. In May 1941, the building was transferred to the Production Division and used as an Adamsite candle assembly plant. From November 1943 until June 1945, the building was used to fill bombs with napalm (PT1) ("History of Edgewood Arsenal" ca. 1945). Actual production was 7,000 500-lb bombs (Edgewood Arsenal Plant Status 1946). After World War II, the building was used to fill smoke pots with hexachloroethane (HC). In 1948, the building was an asbestos grinding plant (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical file). The building currently is vacant.

Support Buildings

Building E5005 was constructed in 1918 as a foundry; it measures approximately 28 (3 bays) x 62 (6 bays) feet. The building has a steel-frame and rests on a concrete slab. The walls are constructed of ridged structural clay tiles. The gabled monitor roof is sheathed with corrugated metal. The monitor contains metal-frame, six-light fixed windows interspersed with wood louvered panels. In 1918, the monitor contained a band of wood louvered panels. A central doorway occupies the front (south) elevation. The doorway contains an overhead track door that replaced the original paired wood doors. The windows are metal-sash, multi-light industrial units with brick lug sills. A two-bay addition was added to the north end of the building. The addition contains an overhead roll door in the north elevation and metal-frame, industrial sash windows. The building was subsequently used as an ordnance automotive paint shop.

Building E5232 was constructed between September and October 1918 as a maintenance machine shop (Marshall and Ellicott 1919b:121-122). In 1928, the shop was burned, but rebuilt in a similar size as the earlier shop. The one-story building measures approximately 149 (14 bays) x 48 (5 bays) feet. The building is constructed of structural clay tile and rests on a concrete foundation. The building originally had a monitor roof that extended the full length of the building. The building currently has a gable roof sheathed with corrugated metal. The windows are modern industrial sash replacements. A pair of modern glass doors occupies the west elevation. A single metal door is located in the east elevation. During World War II, this building was used as a carpenter shop to manufacture wood boxes and crates. The shop remained a carpenter shop until 1957, when the building was converted to manufacture elements used in gas masks (EAI Corporation, Inc. Building E5232; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files). The building has been adapted for administrative uses.

Building E5135 is assigned a construction date of 1918 in the APG real property records although it did not appear on the 1919 Edgewood Arsenal map (Edgewood Arsenal 1919). The one-story building measures approximately 37 (3 bays) x 51 (5 bays) feet. The building is constructed of structural clay tile and has a monitor roof with bands of metal-frame windows. The windows are metal-frame industrial sash; some windows are covered. A single wood door with lights is located in the south elevation and a single metal door is located in the west end. A metal overhead roll door occupies the south elevation. The old building number for this building (#83) was listed in the 1919 completion report, but it was not identified or described in the report. This suggests that the building was planned for construction, but not completed (Ellicott and Marshall 1919a:18). The building appeared on a 1929 photo mosaic of the arsenal (Edgewood Arsenal 1929). Between 1922 and 1944, the building was used as a paint shop. In 1941, the building was redesignated as a pilot plant. Between 1944 and 1946, the building functioned as a carpenter and paint shop. In 1957, the building was assigned as part of a pilot plant to research the nerve agent VX (EAI Corporation, Building E5135).

Building E5136 is assigned a construction date of 1945 in the APG real property records. However, the building appeared on the 1929 photo mosaic of the arsenal, but not on the 1919 map (Edgewood Arsenal 1919; Edgewood Arsenal 1929). The building was probably constructed ca. 1920 as a storage building for Building E5135. The one-story building measures approximately 10 (1 bay) x 20 (1 bay) feet and is constructed of structural clay tile. The front-facing gable roof is sheathed is composition roll roofing. The east (front) elevation contains paired metal doors.

Building E5137 (HA-2094) was constructed in 1918 as a compressor house to support the shell filling plants. Building construction started February 1918 and was completed by March 1918 (Marshall and Ellicott 1919b:143-144). The one-story building measures approximately 35 (1 bay) x 103 (3 bays) feet. The steel-frame building has ridged structural clay exterior walls and rests on a concrete slab. The front-facing gable roof is sheathed with corrugated metal. The windows are

metal-frame, one-over-one-light replacement units. A single metal door and a metal overhead roll door occupy the south (front) elevation.

Building E5173 is actually two buildings, a battery charging house to support the industrial railroad locomotives and a motor generating house, both constructed between September and November 1918. At the time of the Armistice, the buildings were enclosed but not completed. The east section of the building measuring approximately 53 (1 bay) x 93 (3 bays) feet was constructed as the battery charging house. The one-story east section rests on a concrete foundation. The exterior walls are constructed of ridged structural clay tile. The shallow gable roof is sheathed with composite roofing. Each gable end originally contained five sets of wood doors. Currently the front (south) elevation contains two metal overhead garage roll doors installed since 1982. The north elevation contains a single doorway. The windows are four-light, metal-frame units with concrete sills. The west section of the building measuring approximately 21 (2 bays) x 47 (5 bays) feet was constructed as the motor generating house. The one-story west section is constructed of ridged structural clay tile and has a shed roof. Single doorways are located in the southern bay of the east elevation and in the northern bay of the west elevation. A gable hood supported by plain brackets shelters the doorway on the west elevation. A one-story, structural-clay tile addition constructed by 1942 joins the two buildings (Marshall and Ellicott 1919b:150-521; Edgewood Arsenal 1942 map; HABS 1982). During World War II, the combined building served as the electric shop. The larger east section of the building was the shop and tool room, while the west section served as the office (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files; "History of Edgewood Arsenal" ca. 1945).

Utilities

Building E5126 was built between November 1917 and March 1918 as the central power house for shell filling plant # 1. The building comprises two sections, a two-story boiler house on the north end and a one-story engine room on the south end. The entire building rests on a concrete slab and has structural clay tile walls supported by external brick pilasters. Both sections have gable roofs sheathed with composition roll roofing. The two-story section is approximately 52 (3 bays) x 174 (11 bays) feet. The original roof configuration for the two-story section was a monitor roof. The north gable end is outlined with corbelled brick at the eave. One overhead metal roll door occupies the north gable elevation and a circular vented opening is located in the upper gable. Windows in the two-story section are metal-frame, multi-light industrial sash along the eave. Two massive external brick stacks constructed in 1941 are located west of the two-story section; external metal reinforcement hoops strengthen the tapering stacks. Originally the building had four external metal stacks. The southern one-story section measures approximately 52 x 142 (9 bays) feet. Large, metal-frame, 30-light, industrial sash windows are located in the long (east and west) elevations. A modern metal door occupies the east elevation of the one-story section. A one-bay by four-bay, vinyl-clad office addition adjoins the southwest corner of the one-story section. Building E5126 was the central power plant for Edgewood Arsenal during World War I. The plant provided electricity, steam heat, and compressed air. Building E5126 remained the primary source for electricity for the installation through World War II, although the installation also was connected to the local utility company. The two-story section was constructed to house eight, coal-fired boilers. The one-story section contained a steam turbine, an electric generator, turbines, ammonia compressors, and ice machines. None of the original equipment is extant. The coal-fired boilers were replaced with oil-fired boilers in 1941 (Marshall and Ellicott 1919b:20-24; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files; Grandine and Cannan 1995). Two 300,000 heating fuel oil tanks (Facilities E5124 and E5127) were installed near the power plant in 2004 (APG real property records).

Building E5125, constructed in 1918, is a one-story storage shed located east of Building E5126. The building measures approximately 31 (1 bay) x 13 (1 bay) feet. The shed rests on a concrete slab. The walls are structural clay tile. The shed roof is finished with built-up roofing. The sliding metal doors in the east elevation were replaced with a plywood door after 1982. A six-light fixed window is located in the west elevation. A one-story, concrete-block addition is attached to the south elevation (APG real property records; HABS 1982).

Structure E5117 is an elevated water storage tank that was constructed in 1918 near the central power plant (Building E5126) (APG real property records). The cylindrical steel tank is 28 feet in diameter with a spherical steel bottom and a conical top. The tank is connected to the ground by a central pipe. The tank has a 50,000-gallon capacity. The tank is supported on four steel legs that rest on concrete footers; the steel legs are strengthened with crossed cables.

Building E5292, an incinerator, is assigned a construction date of 1918 in the APG real property records. However, it did not appear on the 1919 map of Edgewood Arsenal (Edgewood Arsenal 1919). It was probably constructed in 1923, the year that a completion report was filed for the construction of a 5-ton incinerator and garbage can wash plant (NARA, RG 77, Entry 391, Box 96). The one-story, gable-roofed building measures approximately 26 (1 bay) x 21 (1 bay) feet and rests on a raised concrete foundation. The upper portion of the building is stuccoed masonry. A large exterior concrete chimney is located on the east elevation. The north elevation contains a central doorway. Two window openings occupy the south elevation; one window opening occupies the west elevation. The openings contain no glazing. The building currently is a ruin.

General Storage

Building E5609 was constructed between 25 June and 5 October 1918 as an oil storage building in the chemical plant area (Marshall and Ellicott 1919c:44-45). Located off Alley Road, the one-story building measures approximately 51 (3 bays) by 41 (3 bays) feet. The building has structural clay tile walls and rests on a poured concrete foundation wall. The gable roof is sheathed with composition roll roofing. Paired wood doors occupy the center of the east and west elevations. A concrete loading platform spans the east elevation; the concrete loading platform along the west elevation has been adapted to a personnel entry. The windows are metal-frame industrial sash. During World War II, this building served as a dispensary (EAI Corporation, Building E5609). In the 1950s, the building served as office space (EAI Corporation, Building E5609).

Building E5611 was constructed between 15 June and 15 September 1918 as a storehouse in the chemical plant area (Marshall and Ellicott 1919c:46-47). Located off Alley Road, the one-story building measures approximately 112 (7 bays) by 51 (1 bay) feet. The building has structural clay tile walls and rests on a poured concrete foundation wall. The gable roof is sheathed with composition roll roofing. Two sets of paired wood doors occupy the east and west elevations. Wood loading platforms originally spanned the east and west elevations; these platforms are no longer extant. The windows are metal-frame industrial sash.

Ordnance Storage

Buildings E1930, E1932, E1942, E1950, and E1958 (HA-1962) are identical storage magazines constructed in 1918 as part of an eleven building complex located north of the main industrial area. The buildings were constructed between June and December 1918 as magazines to store completed chemical munitions prior to shipment (Marshall and Ellicott 1919b:109-115). The buildings were arranged in rows and sited 100 feet apart with access to railroad tracks. Each

warehouse measures approximately 100 (2 bays) x 202 (10 bays) feet and is constructed of 8-inch structural clay tiles that encase a steel frame. Each building rests on a concrete foundation. Each monitor roof originally had bands of industrial sash windows in the clerestory. The current roof cladding is not visible. Each warehouse originally had ten wood sliding doors located along the long (north and south) elevations. Concrete loading platforms were constructed along the north elevations of all the warehouses. The loading platforms that spanned the south elevations were constructed of concrete on three buildings and wood for the remaining magazines. Loading platforms are no longer extant. In 1920, the buildings were transferred to the Edgewood Chemical Reserve Depot when that organization was established (Scaggs 1945).

Between 1995 and 2000, the buildings were substantially altered to accommodate administrative uses and laboratories. The exteriors have all been refinished using Dryvitt. Common alterations include infilling original door openings along the side elevations, inserting new windows, and covering or replacing the clerestory windows. Building E1942 has a projecting pediment applied to the west elevation over two new doorways installed in 1997 (APG real property records). The pediment is supported by three pillars with simple ornamental caps. Building E1930 had a new two-story, five-bay by eight-bay addition constructed on the east elevation prior to ca. 1976 (APG real property records; HABS 1982).

Building E1936 (HA-1962) was constructed ca. 1920 as a flammable materials storehouse. Building E1936 did not appear on the 1919 map of Edgewood Arsenal, but was constructed by 1929 (Edgewood Arsenal 1919, 1929). The one-story building measures approximately 25 (1 bay) x 60 (3 bays) feet and is constructed of structural clay tile on a concrete foundation. The gable roof is sheathed with composition roll roofing. Three circular metal vents project from the roof ridge. A large metal overhead roll door replaced the older wood door on the south (front) gable end reported in 1996 (Robinson & Associates, Inc. 1996). Twelve-light windows containing wire glass with brick surrounds on the side elevations have been replaced with clear glass replacement units.

Building E1946 (HA-1962) was constructed as the depot headquarters in 1924. The original configuration of the building was rectangular and originally contained 1,746 square feet of office space for depot employees. In 1942, the building was expanded to 4,193 square feet to accommodate administrative functions during World War II (Scaggs 1945:21). The one-story building is constructed of structural clay tile with 15 asymmetrical bays along the front (north) elevation and three bays along the east elevation. The building has an asymmetrical floor plan. The roofline incorporates intersecting gables and a half-hip, all sheathed in composition roll roofing. The doors and the six-over-six-light, double-hung sash windows are modern replacement units installed in 2000. The main entry is off-center on the north elevation and contains a modern glass door divided into lights with sidelights installed in 2000. A projecting gable roof shelters the entry. This roof is supported on three square pillars with plain capitals that were added in 1995 (APG real property records; Robinson 1996).

Building E1890 is a one-story building constructed in 1918 as an empty shell storage building. The eighteen-bay building measures approximately 100 (3 bays) x 701 (16 bays) feet. It was constructed on a concrete slab with a structural steel beam and girder frame. Originally the building was constructed with "galvanized iron corrugated sheathing on the end elevations (extending) down 7'0" from underside of roof on side elevations, the remainder of the side elevations being open" (Marshall and Ellicott 1919b:141-142). By 1935, the exterior walls were enclosed with corrugated asbestos siding (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, photographic files). External metal sliding track doors were installed along the side elevations. The shallow gable roof is sheathed with composition roll roofing. A brick firewall projects from the roof approximately nine bays from the west end. At-grade concrete loading platforms span all elevations of the building. The east end has a three-bay addition constructed by 1942

(Edgewood Arsenal 1942) of common bond (6:1) brick. This addition has two sets of paired metal doors with six lights on the south elevation and six windows on the east elevation.

INTER-WAR ERA (1920-1939)

Buildings E5476 through E5489 form two separate pilot plant complexes located west of the original World War I mustard gas plant. These buildings were not constructed during World War I; the buildings were not documented in the extensive completion report prepared in 1919 for Edgewood Arsenal or on the 1919 map (Marshall and Ellicott 1919; Edgewood Arsenal 1919). The buildings did appear on a 1929 photo mosaic of Edgewood Arsenal (Edgewood Arsenal 1929). In historic records, these buildings are identified as temporary construction (APG real property records).

Building E5476 has a two-story, metal-frame main block constructed in 1920-1921 that is surrounded by one-story additions dating to 1944, 1951, and 1952 (Edgewood Arsenal 1929; HABS 1982). The main block measures approximately 40 x 40 feet; the metal frame is clad with corrugated transite. The main block has a gable roof sheathed with corrugated transite. The main block has a band of metal-frame industrial sash windows below the eave. A second band of industrial sash windows is visible on the south elevation of the main block. Two wood doors with exterior metal hinges are centrally located on the west end. A one-story addition constructed of structural clay tile spans the north elevation of the main block. This addition has a shed roof sheathed with composition roll roofing. A one-story, wood-frame, L-shaped addition with board-and-batten wood siding extends from the east elevation. A one-story, prefabricated concrete addition was constructed on the west end of the north addition. All windows in the additions are boarded up. The building was constructed to produce diphenylchlorarsine (DA), an irritant smoke. Between 1925-1926, the plant was used to produce mustard gas using the thiodiglycol method. During World War II, the building housed a lewisite pilot plant. In 1945, the plant was used for six months to produce distilled mustard gas (HD). Production during this time resulted in over 2.8 million lbs of HD (Edgewood Arsenal Plant Status 1946). Between 1950 and 1954, the building was re-used to support a classified project dealing with radiological simulant munitions loading. From the early 1960s through the mid-1970s, the building was used as an experimental munitions loading plant for CN, DM, and CS (EAI Corporation, Building E5476). The building currently is vacant.

Building E5481, constructed ca. 1921, is a two-story building constructed of a steel frame clad with corrugated metal siding. The building rests on a concrete foundation. The building measures approximately 26 (2 bays) x 40 (5 bays) feet with an addition along the north elevation that measures 15 x 40 feet. The main building has a gable roof while the addition has a shed roof. The roofs are sheathed with composition roll roofing. The windows are fixed, wood-frame, six-light units located below the eave line. A sliding door is located in the first story of the front (east) elevation of the main building. A single doorway accessed by a flight of wood steps is located above grade in the east end of the addition. The building was used as an experimental plant to produce diphenylchlorarsine (DA), an irritant smoke from ca. 1921 through the 1930s. During World War II, the building was converted to a whetlerite pilot plant (EAI Corporation, Building E5481).

Building E5487, constructed ca. 1922, is a two-story building constructed of a steel frame clad with corrugated metal siding. The building rests on a concrete foundation and measures approximately 26 (1 bay) x 40 (3 bays) feet. The gable roof is sheathed with composition roll roofing. A band of fixed, wood-frame, six-light windows are located below the eave line; some window openings are also on the first floor. Paired wood doors are located at ground level on the east end. Paired sliding doors are located on the north elevation. The building was constructed as an experimental lewisite (M-1) production plant. Lewisite is a vesicant that causes blisters, irritates eyes and lungs, and affects blood and nerves. Lewisite production

continued until 1926, when the plant was placed on standby. During World War II, the plant was used to produce Bis-(2-chloroethyl) sulfide/1, 2-bis (2-chloroethyl-thio) ethane (HQ). The building was modified for use in the development of a chemical process for nerve agent manufacture from the late 1940s through the 1950s. The plant has been inactive since 1966 (EAI Corporation, Building E5487).

Building E5485 was constructed in 1922 as the fan house for the experimental lewisite plant. The small one-story building measures approximately 9 (1 bay) x 12 (1 bay) feet. The building rests on a concrete foundation and has a steel frame. The walls and shed roof are clad with corrugated metal. A single doorway is located in the north (front) elevation. One wood-frame, six-light window occupies the east elevation (EAI Corporation, Building E5485). The building currently is vacant.

Building E5489 was constructed in 1922 as an office, laboratory, first aid station, and locker room for the experimental lewisite plant. The one-story building measures approximately 21 (3 bays) x 11 (1 bay) feet. The building rests on a concrete foundation and has a steel frame. The walls and shed roof are clad in corrugated metal. A central doorway occupies the front (east) elevation. Window openings on all elevations are boarded up (EAI Corporation, Building E5489). The building currently is vacant.

Building E5307 was constructed in 1921 as a chemical laboratory; the building did not appear on the 1919 map of Edgewood Arsenal (Edgewood Arsenal 1919). Between 1921 and 1959, the building was used to test gas mask canisters mechanically. During the late 1950s, the building was reconfigured to contain X-ray equipment (EAI Corporation, Building E5307). Since 1970, the building has been used for administration. The one-story building measures approximately 117 (9 bays) x 30 (1 bay) feet and is constructed of ridged structural clay tile on a concrete slab. The gable roof is sheathed with composition roll roofing. The roof has exposed rafter ends. Two off-center single doorways are located in the front (east) elevation. The doorways are sheltered by shed roofs supported by chamfered wood brackets. Paired off-center metal doors with lights occupy the south end; this entry is protected by a metal hood. The windows are modern, metal-frame, horizontal four-light replacement units. A porch is formed on the rear elevation where the rear walls are recessed. The roof extends over this area and is supported by chamfered square posts.

Building E5049 was constructed as a powder house ca. 1919. It was located in the World War I-era smoke shell filling plant area. The building is one story and measures approximately 15 (1 bay) x 17 (2 bay) feet. The walls are constructed of ridged structural clay tile. The building has a shallow shed roof. The front (east) elevation contains paired metal doors. After 1928, the building was designated as storage. It served as a storage building until 1990, when it was converted into an office for Building E5050. In 1990, a one-story, concrete-block addition was constructed on the west end to double the building's size (EAI Corporation, Building E5049).

Building E5182 was constructed as a flammable materials storehouse in 1932 (APG real property records). It is located west of the firehouse (Building E5180). The one-story building measures approximately 19 (1 bay) x 7 (1 bay) feet. The building is constructed of parged structural clay tile. The building has a shed roof sheathed with corrugated metal. The front (east) elevation contains a metal door. A plywood extension spans the rear (west) elevation.

Building E5181T was constructed as a storehouse in 1932 (APG real property records). It is located west of the firehouse (Building E5180). The one-story building measures approximately 26 (3 bays) x 16 (1 bay) feet. The building is wood frame with flush horizontal wood siding. The gable roof is sheathed with asphalt shingles and has a central metal vent

projecting from the roof ridge. The centrally-located doorway on the front (east) elevation contains paired five-panel wood doors. The windows are wood-frame, hinged three-over-three-light units.

WORLD WAR II (1940-1945)

Administration

Building E5101 was constructed in 1943 as the headquarters building for arsenal operations. The building is located west of Hoadley Road and is oriented northeast to southwest with the primary elevation facing the road. The exterior of the building exhibits minimal stripped ornamentation reflective of the Moderne style. The U.S. Army Corps of Engineers and Van Rensselaer P. Saxe were the consulting engineers; Cummins Construction Corporation was the construction contractor (APG drawings files; HABS 1982). The two-story building measures approximately 280 (17 bays) x 122 (5 bays) feet. Each floor is configured with a central corridor flanked by office space surrounding two interior light courts. The building rests on a concrete foundation and is constructed of concrete block walls. Dryvit and stucco were applied to the exterior walls in 1996 (APG real property records). Three bays at the corners of the southeast and northwest elevations step out to suggest corner piers. The roof is flat with a parapet. Ornamentation is centered around the doorways. The primary (front) entry is located in the center of the southeast elevation. The central bay is framed by a simple two-story, concrete surround. Paired modern glass and aluminum doors are set under a cantilevered hood ornamented with eagle sculptures. Glass block panels flank the entryway; glass block also is installed on the second story above the doorway. Centrally-located entries set in two-story concrete surrounds are located on the south end and rear elevation. The windows are tripled, three-light units installed since 1982 (HABS 1982). The windows have continuous concrete lintels and sills. The building was constructed to consolidate all administrative functions for Arsenal Operations during World War II. In 1956, the building was rehabilitated to accommodate the Headquarters, Chemical Corps Material Command, which moved from Baltimore, MD. The building was renovated again during the 1960s, including the addition of air conditioning. The building has served administrative functions since it was completed (EAI Corporation, Building E5101; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building vertical file).

Building E5146 was constructed in 1964 to house the air conditioning equipment installed in Building E5101. The one-story, concrete-block building measures 29 (1 bay) x 46 (1 bay) feet. The roof is flat with a parapet wall. An off-center, metal overhead track door occupies the southeast (front) elevation. Three sets of triple six-over-six-light, double-hung sash windows occupy the north elevation.

Building E5699 was constructed in 1942 as a guardhouse at the western edge of Edgewood Arsenal on Magnolia Road. The building measures approximately 12 (1 bay) x 17 (1 bay) feet. It is constructed of running bond brick and exhibits elements of Colonial Revival style. The guardhouse rests on a concrete slab. The gable roof is sheathed with asphalt shingles. The eave has a box cornice and returns at the gable ends. An exterior brick chimney occupies the east end. The north and south elevations each contain a single four-light over three-wood panel door. A projecting hood shelters each doorway. The windows are wood-frame, six-over-six-light and eight-over-eight-light units. The windows have brick lug sills. A circular window opening with a brick surround is located in the south elevation.

Building E5554 was constructed in 1943 (APG real property records) as a change house and office building for the World War II chlorine plant (EAI Corporation, Building E5554). The one-story building is constructed of structural clay tile on a concrete wall foundation with a shed roof sheathed with rolled roofing. The building measures approximately 40 (3 bays) x

62 (8 bays) feet. The windows are wood-frame, six-over-six-light and four-over-four-light, double-hung sash units. A single metal door with one light is located off center on the north (front) elevation; the doorway was infilled to fit the door. The door is accessed by a flight of concrete steps and a concrete stoop. A single metal door is located on the west elevation. Between 1948 and 1968, the building was leased to a contractor for a change house and office. In 1968, the building was transferred to the Munitions Fill Development Branch for research and development. In 1978, the building was transferred to the Chemical Services Laboratory (EAI Corporation, Building E5554).

Chemical Plants

Building E5365 was constructed in 1942. The building originally was designed as a phosgene (S3/S4) mixing building, but, when completed, it was outfitted with shoe impregnation equipment. The building stood idle until January 1943, when it became an instrument repair shop and served as such for the duration of World War II (EAI Corporation, Building E5365). The two-story building measures approximately 61 (5 bays) x 41 (2 bays) feet. The building has a steel frame clad with corrugated transite. The gable roof is sheathed with corrugated transite. The windows are metal-frame industrial sash units. The main entry is located on the north (front) elevation. The off-center doorway contains paired metal doors and a projecting enclosed vestibule. An at-grade concrete loading dock spans two-thirds of the north elevation and is sheltered by a cantilevered metal hood. A single metal door with lights is located in the west end. Another door accessed by an exterior metal stair is located in the center of the second-story of the south (rear) elevation. A one-story, shed-roofed addition projects from the southeast corner of the building. The addition is clad with corrugated transite and contains a single metal door with four lights.

Building E5356 was constructed in 1942 as a gas and acid storage building. The one-story building is constructed of ridged structural clay tile and rests on a concrete foundation. The building measures approximately 42 (3 bays) x 21 (2 bays) feet. The flat roof has a parapet wall. Three sets of paired metal doors with lights are asymmetrically arranged along the east (front) elevation. Two sets of metal-frame industrial sash windows with concrete slip sills occupy the south, west, and north elevations.

Building E5380 (HA-1994) was constructed in 1941 as a production plant for chloracetophenone (CN), a strong tearing agent. The two-story building is constructed of a steel-frame on a concrete foundation and clad in corrugated transite siding. The building was in operation between December 1941 and March 1943 and again between June and July 1944. In all, this plant produced 908,601 lbs of CN; 5,281,534 lbs of CNB solution; and, 3,258,500 lbs of CNS solution (Edgewood Arsenal Plant Status 1946). In 1997, the building contained only a few remnants of equipment, primarily vats, ovens, and air scrubbing equipment (Grandine and Armstrong 1997). The description of Building E5380 is detailed in Maryland Inventory of Historic Properties form HA-1994 prepared in 2004.

Building E5375 is a one-story, shed-roof flammable materials storehouse that measures 23 (1 bay) x 38 (3 bays) feet located east of Building E5380. The storehouse was constructed in 1942 of concrete. Building E5375 has a pair of metal, hinged doors in the west (front) elevation and wood-frame industrial sash windows along the north elevation. A one-story tile building attached to a large metal cooling tower is located next to Building E5375. The circular metal cooling tower (E5373) is encased in a wood box frame.

The World War II Adamsite (DM) plant is located south of Magnolia Road and west of Alley Road. Adamsite is an irritant smoke. The complex was constructed in 1941 by Whitman, Requardt & Smith-Engineers of Baltimore, Maryland, from

plans prepared in 1939 (EAI Corporation, Building E5648). The complex currently contains seven buildings; Building E5639 is no longer extant. The original uses of the buildings were not documented in the building vertical files of the U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team. Six buildings currently are vacant and cleared of equipment. Building E5641 has been renovated for offices. The following descriptions follow the building arrangement from north to south.

Building E5648 is a one-story industrial building that measures approximately 135 (9 bays) x 30 (3 bays) feet and is the largest building in the complex. The westernmost six bays are accessed at grade, while the easternmost three bays are raised on a concrete base that forms elevated concrete loading platforms. The building is constructed of a steel frame and clad with corrugated transite on the walls and gable roof. The north elevation has six sets of paired metal doors with four lights. The roof extends over this section to shelter the north elevation. The east elevation has paired wood doors with external hinges. Metal-frame, industrial sash windows, primarily 20-light and 15-light units, are located on all elevations. A two-story tower rises from the south side of the raised east end of the building. The upper story of the tower is accessed by an external metal stairway. A large metal "Roto-Clone" wet filter that removed particulates from the air ventilation system sits on the concrete loading platform along the south elevation of the building. A wood-frame, one-story addition projects from the south elevation of the west end of the building. Although constructed as a DM manufacturing and filling plant, the historical record is unclear if DM actually was manufactured in the plant or purchased from outside contractors. One source reported that small batches of DM were manufactured in the building between 1941 and 1943, but no large-scale production occurred. A second source stated the DM was not produced in the plant between 1941-1943 (Historical Branch 1943; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical file). From October 1942 to September 1943, the plant filled M2 DM irritant gas candles (EAI Corporation, Building E5648). During the 1950s, the building was used to assemble and pack munitions. During the 1960s and 1970s, the building was used to grind, mix, and blend charcoal to produce whetlerite charcoal (EAI Corporation, Building E5648). When surveyed in October 2004, Building E5648 was cleared of equipment.

Building E5645 is a one-story building measuring approximately 21 (1 bay) x 25 (3 bays) feet. The building is metal frame clad with corrugated transite on the walls and gable roof. The building sits on a concrete slab. Paired metal doors with four glass lights are located in the north, west, and south elevations. The east elevation has three industrial sash windows, while the west elevation contains two windows.

Building E5643 is a one-story building measuring approximately 33 (1 bay) x 17 (1 bay) feet. The building is metal frame clad with corrugated transite on the walls and shed roof. The building sits on a concrete slab. Paired metal doors with six glass lights are located in the north, west, and south elevations. The east elevation has a bank of industrial sash windows.

Building E5641 was constructed in 1941 as an office, locker room, and laboratory; the building currently is used for office space. The one-story building measures approximately 80 (5 bays) x 47 (2 bays) feet. The building is constructed of a steel frame with corrugated transite walls on a concrete foundation. The gable roof is sheathed with corrugated transite. The front (east) elevation contains one set of paired metal doors with single lights and one single metal door with one light. The building has metal-frame industrial sash windows; most are 16-light units. Some replacement units have been installed in the building. A concrete-block and glass greenhouse (Building E5642) was constructed in 1988 on the south elevation of the building.

Building E5637 is a one-story building that measures 17 (2 bays) x 17 (2 bays) feet. The building has a metal frame clad with corrugated transite on the walls and shed roof and rests on a concrete slab. The doorways contain paired metal doors with four lights. The windows are metal-frame, industrial sash 16-light and 20-light units. A metal sign over the doorway in the east elevation identifies the building as a quality control lab.

Building E5635 is a one-story building that measures approximately 25 (3 bays) x 21(1 bay) feet. The building has a metal frame clad with corrugated transite on the walls and gable roof and rests on a concrete slab. Paired metal doors with four lights occupy the north and south elevations. The windows are 16-light, metal-frame industrial sash units. The building has been used in filling tearing agents and colored smokes. During the 1980s, the building was used for storage by the medical research personnel (EAI Corporation, Building E5635).

Two identical buildings that appear to have been constructed during the 1980s are located west and south of Building E5635. Each building rests on a concrete slab and has plywood walls. Each building has a band of metal grills spanning the front under the eave. The barely gabled roof is sheathed with composition roll roofing. The buildings appear to be animal pens and may be associated with the use of Building E5635 as storage for medical research (EAI Corporation, Building E5635).

Shell-Loading Plants

Building E5185 was constructed in 1942 as a mustard munitions filling plant. The large one-story building measures approximately 147 x 1,021 feet. The building has a steel frame set on a concrete foundation. The walls are clad with corrugated transite. The gable roof, which is sheathed with corrugated transite, incorporates an extension that spans the north elevation. Multiple metal single and overhead roll doors punctuate the side elevations. Most doorways have access from individual concrete loading docks. The windows are multi-light industrial sash units. The building was designed by Whitman, Requardt & Smith-Engineers, and the U.S. Army Quartermaster Corps. Originally, the interior configuration of the building was divided into three sections. The east end was used to store incoming empty shells. The middle section contained two filling lines, one for filling bombs and one for experimental munitions filling. The west end was used to store H-filled shell and bombs. By 1943, a third filling line was installed in the building. The plant production capacity was 12,000 75mm and 4,500 155mm shells per 24-hour period. Between 1941 and 1945, the plant filled 115-lb bombs, 10-lb M74 bombs, 100-lb bombs, 4.2-inch CM shells, 75mm shell, 60mm shell, 155mm shell, and land mines. In all, the plant filled 43,067 bombs; 2,362,935 shells; and, 52,730 land mines with mustard agent. In 1945, the building was placed on standby status. In 1948, excess materiel for the Spare Parts Branch was stored in the building when the branch moved from the Gulf Chemical Depot to Edgewood. The building was used for general storage in 1962. In 1985, the building was renovated to house all shop facilities for the installation. No original shell filling equipment remained in the building in 1997 (Edgewood Arsenal Plant Status 1946; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building vertical file; HABS 1982; Grandine and Armstrong 1997).

Building E5188 (HA-1852) was constructed in 1941 as a miscellaneous filling plant. The one-story building measures approximately 306 (8 bays) x 73 (3 bays) feet. The building has two sections; both sections rest on concrete foundations. The west end is constructed of reinforced concrete and has a gable roof that is slightly higher than the east section of the building. The east section of the building is metal frame with corrugated transite exterior walls. The broad gable roof also is sheathed with corrugated transite. Many metal vents and air handlers project from the roof. Eight doorways are located on the south elevation. The doorways are accessed by a continuous concrete loading dock. Paired metal doors also are located in the east elevation. The north, east, and south elevations contain metal-frame, multi-light industrial sash windows. Metal-

frame casement windows are located in the west end of the building. Whitman, Requardt & Smith-Engineers, worked with the U.S. Army Quartermaster Corps to produce the building plans. The building was planned as a filling plant for FS (fuming sulphuric acid), a smoke agent, and CNS and CNB, both tearing agents. The west end of the building contained metal storage tanks for the raw materials. The raw materials passed through a mixing room and then to the filling line that was located along the north side of the building. Empty and filled shells were stored in the south half of the building. The east end of the building contained the office, first aid room, toilets, showers, and locker room. The FS, CNS, and CNB shell filling plant operated in Building E5188 between October 1941 and July 1944. In July 1944, the equipment was removed and new equipment was installed to produce white phosphorus (WP). In 1945, the building was equipped to fill shells with plasticized white phosphorus (PWP). By the end of World War II, this plant had produced 551,252 lbs of PWP and filled 3,949 bombs, 2,728,080 rockets, 300 shells, and 1.3 million land mines (Edgewood Arsenal Plant Status 1946). In 1997, the building still retained a xylene hood, a mixer, two reservoirs, two extruding hoppers, two PWP mixers, and a Jeffrey Rigid Hammer Mill, all equipment from the PWP filling line installed in 1945 (Grandine and Armstrong 1997). At the end of 1945, the plant was placed on standby. The plant operated between September 1951 and January 1952 during the Korean conflict. At that time, the plant produced 18,763 bombs. In 1953, operations in the plant were redesigned to automate the shell filling process. The plant also operated during the Vietnam War. The plant was used for small-scale WP munitions projects until ca. 1997 (Edgewood Arsenal Plant Status 1946; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building vertical file; HABS 1982; Grandine and Armstrong 1997; Grandine 1994). During the late 1990s, the building was adapted to other uses, and no equipment associated with the filling processes was reported as remaining in the building.

Building E5190 (HA-1852) was constructed in 1942 for benzene storage. The one-story building measures 38 (3 bays) x 25 (2 bays) feet. The building is constructed of concrete and has a shed roof sheathed in corrugated transite. Paired metal doors are located in the front (east) and side (south) elevations. Metal-frame industrial sash windows set over louvered ventilation panels are located on all elevations.

Building E5604 is located east of Alley Road and south of 34th Street. The long one-story building measures approximately 341 (8 bays) x 92 (3 bays) feet with a five-story tower located near the south end of the building. The building has a metal frame and rests on a concrete foundation. The original corrugated transite-clad walls have been modernized with metal panel siding installed by 1998 (HABS 1982; APG real property records). The gable roof is sheathed with composition roll roofing. The original door openings have been modified to accommodate modern paired and single metal personnel doors with single lights. No doors appeared in the tower. A modern entry vestibule containing paired glass doors projects from the front (east) elevation. The original industrial sash windows have been covered over; only portions of the industrial sash were visible. Concrete platforms span all elevations. A one-bay, one-story, gable-roof addition with no openings projects from the south elevation. Building E5604 was constructed in 1942 as the phosgene (CG) filling plant and was designed by Whitman, Requardt & Smith-Engineers and the U.S. Army Quartermaster Corps. However, the building was converted to fill shells with mustard gas. By mid 1942, the building was used to paint, pack and ship CG shells. The production capacity of the plant was 75,000 4.2cm shells with CG and 3,600 4.2cm shells with FS per 24-hour period. In all, approximately 661,126 shells were filled in this building. Agents placed in the shells included CG, CNB, CNS, FS, CNS, FS, CNB, and CNS. In 1963, the building was adapted to produce charcoal filters for gas masks. Equipment used in a gravity-run charcoal sorting process was installed in the tower in 1963 and was surveyed as part of the Object Inventory conducted for APG in 1997; no other elements of the charcoal filter production process were located in the building (EAI Corporation, Building E5604; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files;

Edgewood Arsenal Plant Status 1946; Grandine and Armstrong 1997). This building no longer retains sufficient integrity of design, materials, workmanship, or feeling to represent a World War II industrial building.

Building E5602 was constructed in 1942 as a caustic soda storage shed to support operations in Building E5604. The one-story building measures approximately 21 x 11 feet. The building rests on a raised concrete foundation and has a metal frame clad with corrugated transite. A doorway containing paired doors occupies the west (front) elevation. The doorway is accessed by concrete stairs and a small concrete loading dock.

Building E5282 was constructed in 1942 to store incendiary bomb materials to support work that occurred in Building E5265. Building E5282 has overall dimensions of approximately 57 x 58 feet with an irregular footprint. The central core of the building rises two stories and is constructed of reinforced concrete. This core is surrounded by concrete-block walls on the first story. One-story, wood-frame additions project from the west and east elevations. The roofline of the building is varied. The concrete core has a flat roof with a parapet, while the wood-frame sections have shed or gable roofs. Metal ductwork projects from the roofs. The most prominent wing projects from the west elevation. This one-story, wood-frame wing is clad with diagonal wood siding and has a front facing gable roof sheathed with asphalt shingles. Immediately after World War II, the building was used for storage. During the 1960s, the building was used as a dry-and-grind facility for HC smoke munitions. Between 1965 and 1976, the research and development community used the building for a variety of chemical research projects (EAI Corporation, Building E5282). The building currently is vacant and is protected by physical security measures.

Protective Equipment Branch

Building E5685 was completed in 1941 as a collective protector and canister plant. It was located west of Canal Creek near the main gas mask factory (no longer extant). The one-story building measures approximately 281 (6 bays) x 62 (3 bays) feet and features a three-story tower. The building has a metal frame that rests on a concrete-wall foundation. The exterior walls are clad in corrugated transite. The broad gable roof also is sheathed with corrugated transite. Many metal vents project from the roof. Six doorways are located on the south elevation. The east and west elevations contain three doorways each. Most of the doorways on the east, west, and south elevations contain modern metal overhead doors with a few single metal doors. The oldest door is located near the northeast corner of the east elevation; this doorway contains paired sliding metal doors with four lights. An extension incorporated under the roof spans the north elevation. This extension contains modern single and paired metal doors. All elevations of the building have bands of metal-frame, multi-light industrial sash windows. The three-story tower has a shed roof with bands of metal-frame industrial sash windows painted white. Narrow concrete loading docks are attached to the east and west elevations. The original purpose of the building was the manufacture of metal parts and the assembly of metal canisters and collective protectors for gas masks. During construction of the building, it was determined that the building could only accommodate the assembly of canisters. Metal parts for the canisters were manufactured in the mechanical shops, and the collective protectors themselves were purchased from private industry. The production capacity for canister assembly in Building E5685 was 100 canisters per 24-hour period. Additional activities completed in the building were painting and packing of collective protectors. Between 1940 and 1960, the building remained a collective protection equipment facility. In 1953-1954, the canister production line was automated to eliminate hand packing. Activities that occurred in the building included assembly of charcoal filters used in the protective canisters, testing of whetlerite charcoal filters to determine their effectiveness against chemical gases, and charcoal screening that occurred in the three-story tower. Between 1960 and 1979, the building was assigned to the Defense Nuclear Laboratory. The laboratory housed a neutron accelerator and betatron accelerator. The research performed in the building related to

nuclear physics and nuclear defense. Between 1979 and 1985, the building was used as a general purpose storehouse. In 1985, the building was renovated into a general purpose laboratory. No equipment from World War II or the Cold War era was located in the building in 1997 ("History of Edgewood Arsenal" ca. 1945:545; EAI Corporation, Building E5685; Grandine and Armstrong 1997; Edgewood Arsenal Plant Status 1946; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, Building vertical file).

Warehouses

Edgewood Arsenal Industrial Area contains several types of general purpose warehouses. General purpose warehouses designated to store inert materials generally were located in the northern section of the industrial area along Magnolia Road where the installation railroad track linked with the main external rail line.

Building E5026, constructed in 1941, is an example of a poured-concrete general warehouse. This rectangular one-story building measures 302 (15 bays) x 68 (1 bay) feet and terminates in a gable roof. The warehouse has a concrete foundation, slab floor, and 7-foot high concrete walls. A steel frame bolted into the concrete wall supports a continuous horizontal band of industrial metal-sash windows along the eave on all four elevations. Corrugated transite siding covers the gable roof and the upper gable ends. The roof ridge has a horizontal metal ventilator. Circular metal ventilators protrude from the roof. The east and west elevations contain fifteen interior sliding metal doors. Raised concrete loading docks span the side elevations. The building was constructed from standardized plan #422-260 dated August 1940 (APG plan #6297-1018 dated September 1940) was developed by the Construction Division of the U.S. Army Quartermaster Corps. The constructing contractor was Whitman, Requardt & Smith-Engineers of Baltimore, Maryland (APG drawings files).

Other examples of this building type in the Edgewood Arsenal Industrial Area include Buildings E5027, E5703, 5707, and E5246. In general, alterations to the buildings include infilled or modified door openings and replacement door units. In the case of Building E5027, the former warehouse was renovated in 1966 to accommodate data processing functions (EAI Corporation, 1991:E5027). It was renovated during the 1990s to accommodate administrative offices (APG real property records). The original door openings were infilled with concrete block. New doors and windows were installed. The continuous band of industrial sash windows was covered with modern siding. Portions of the formerly continuous concrete loading docks enclosed with concrete block to provide additional office space; one enclosure occurred in 1973 (APG real property records). A metal awning was fitted over the single primary entry on the west elevation.

Building E5703, constructed in 1941, currently measures 604 feet long and 68 feet wide. The 1942 Edgewood Arsenal map depicted two separate warehouses in this location that were subsequently joined by an addition to form a continuous building (U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, map 1942). The south section of the building was a 15-bay standard general warehouse; the north end of the building was a 10-bay version following the same plans. Post World War II, five bays were constructed to join the buildings using the same construction materials. The history of the building's construction is evident in the loading docks. Each individual building had continuous concrete loading docks that spanned the side elevations. A partial, stand-alone concrete loading was constructed along the five-bay addition, but was not linked to the previously-existing loading docks. Typical alterations to this building include infilling former door openings with concrete block and inserting metal-frame windows.

Buildings E5057, E5058, E5060, E5061, E5140, E5242, E5244, and E5654 are examples of a second type of general purpose warehouse constructed in 1942 by Whitman, Requardt & Smith-Engineers, and the U.S. Army Quartermaster Corps.

Buildings E5057, E5058, E5060, and E5061 measure 496 (6 bays) x 51 (1 bay) and have six openings along each long side elevation. Each warehouse rests on a concrete foundation. The exterior walls are constructed of ridged structural clay tile that enclose steel frames. Each gable roof is sheathed with composition roll roofing. Originally the roofs had protruding circular metal ventilators; most ventilators have been removed. Exterior metal sliding track doors are located in the side elevations. Each door has an individual loading platform. Building E5060 has a projecting firewall midway in the building; no other building has a firewall. Common alterations to these buildings include replacement doors, the infilling of former door openings with concrete block, modifications to the individual loading platforms, installation of ramps, and insertion of metal hoods over doorways. Buildings E5140, E5242, and E5244 are similar in construction with varied numbers of bays. Building E5140 has four bays along the west elevation; these bays are all infilled and the building has been converted to other uses. Building E5242 is a five-bay version, and Building E5244 has three bays along the east elevation.

Originally, Building E5234 was an example of a five-bay, structural clay tile warehouse. A corrugated transite addition was constructed in 1959 along one side elevation. During the 1990s, all the exterior walls were covered with Dryvitt and stuccoed. The original window openings were modified to accommodate modern windows and all doors were replaced. Subsequent alterations to the exterior have compromised the integrity of materials and design; the building no longer reads as a type of standardized warehouse associated with World War II.

Utilities

Building E5236 was constructed in 1941 as a potable water treatment plant to treat well water pumped from nine wells at Edgewood Arsenal. The building was designed by Whitman, Requardt & Smith-Engineers and constructed by contractors Riggs, Distler Company and Cummins Construction Corporation (Historical Branch 1943). The one-story building is supported on a raised concrete foundation. The building is constructed of concrete and has a flat roof with a scored concrete parapet. The date "1941" is incised in the center of the parapet on the front (north) elevation. During the 1980s, the wells were declared contaminated and the system was shut down. During the 1990s, the building was renovated into a waste water treatment plant to improve the quality of the water being released into the Canal Creek Aquifer. At that time, the industrial sash windows were replaced with modern window units. Many tanks were installed along the north elevation, obscuring the front elevation (Grandine and Cannan 1995; HABS 1982).

Several small structures were constructed over deep wells in several areas of the industrial area. Building E5172 is a one-bay by one-bay well constructed in 1945. The building rests on a concrete slab and has structural clay tile walls. The shed roof is sheathed with corrugated metal. A metal door is located in the south elevation. A four-light fixed window occupies the west elevation.

Building E5176 is a one-story, small building now used as an animal pen. The building has structural clay tile walls and a shed roof sheathed with corrugated metal. A door opening is located in the west elevation and window openings are in the east and south elevations.

Building E5690 was constructed in 1944 as a water pumping station to distribute water carried along the 24-inch water main from the Van Bibber water treatment plant. The one-story building measures 24 (2 bays) x 26 (1 bay) feet. The building rests on a deep concrete wall foundation. The walls are constructed of ridged structural clay tile. The shed roof is sheathed with corrugated metal. The front (north) elevation contains paired wood doors with external hinges and paired small four-

light fixed windows. Pairs of four-light fixed windows are located at the foundation level on the east, south, and west elevations.

Structure E5342 is an elevated water storage tank built in 1941 north of Hanlon Road. The 200,000-gallon capacity water tank is constructed of riveted steel plates. The circular tank measures 38 feet in diameter and has a shallow conical cap. The tank is supported by six steel legs set on concrete footers (HABS 1982). The legs are reinforced by crossed metal struts. A 14-inch pipe connects the base of the elevated tank to the ground.

Structure E5340 is an elevated water storage tank that was constructed in 1941 north of Hanlon Road. The cylindrical steel tank is 28 feet in diameter with a spherical steel bottom and a conical top. The tank has a 125,000-gallon capacity. The tank is supported on four steel legs that rest on concrete footers.

Facility E5128 is a modern electrical substation located west of Building E5126. The substation was established in 1942, when the concrete slab was laid. The equipment on the slab has been continuously renewed.

Facility E5361 is a modern electrical substation. Apparently the original substation in this area was established in 1942, but the current facility has modern, self-contained transformer units installed on the concrete slab. The area is protected by physical security measures.

Facility E5681 is an electrical substation established in 1942 west of Stokes Road. The substation has a concrete slab and a metal superstructure with metal coils. The substation remains in use but upgraded with modern self-contained transformer units installed on the concrete slab. The area is protected by physical security measures.

Building E5330 is a district heating plant constructed in 1942 that measures approximately 113 (5 bays) x 71 (3 bays) feet. The building is approximately 60 feet tall. The exterior walls are constructed of reinforced concrete 12 inches thick, and feature a concrete base and the suggestion of corbelled pilasters that reach almost to the flat, built-up parapet roof. Paired metal doors occupy the north elevation. The building was designed with no windows. Whitman, Requardt & Smith-Engineers were the engineers and Riggs, Distler & Company, Inc., were the prime contractors. The building originally was designed as a high-pressure steam generating plant and was equipped with oil-fired boilers ("History of Edgewood Arsenal" ca. 1945).

Building E5239 is an oil pump house located near the northwest corner of the heating plant. The one-story, concrete building measures 13 x 16 feet. It has a flat roof and a single metal door in the west elevation. Window openings are in the north and east elevations.

Building E5294 was constructed in 1942 as an incinerator (APG real property records; HABS 1982). The one-story building measures approximately 24 (1 bay) x 27 (1 bay) feet and rests on a raised concrete foundation. The upper portion of the building is constructed of running bond brick. The hipped roof is sheathed with slate. A large brick exterior chimney occupies the east elevation. Doors are missing. Windows are paired, metal-frame, six-light units with concrete sills.

Building E5296 was constructed in 1941 as a sewage pumping station (APG real property records; HABS 1982). The one-story building measures approximately 14 (1 bay) x 18 (1 bay) feet and is constructed of running bond brick. The gable roof is sheathed with corrugated transite. A single door is located in the gable end. Windows are twelve-light hinged units.

Miscellaneous Buildings

Building E5239 is a one-story, concrete building that measures approximately 17 (1 bay) x 13 (1 bay) feet. The building was constructed in 1942 to house cooling tower pumps associated with Building E5328 (HA-1991) (no longer extant), the World War II clothing impregnation plant. Building E5239 is currently used for storage. The building has a flat built-up roof with parapet. A single off-center metal door occupies the north elevation. Paired four-light fixed windows occupy the other elevations.

Building E5286 was constructed in 1943 (APG real property records; HABS 1982; Edgewood Arsenal 1942). In 1962, the building was used for storage; by 1982, it was adapted for use as a stable (HABS 1982). The one-story building measures approximately 201 x 29 feet. The foundation is concrete. In 1982, the walls were corrugated transite over steel frame. In 1995-1996, the exterior was re-clad with vertical T1-11 siding and the gable roof was resheathed with asphalt roll roofing. The long elevations contain multiple large sliding wood doors and small modern windows. This building no longer retains integrity of materials or design to its period of construction.

COLD WAR ERA (1946-1989)

Building E5483 was constructed ca. 1951 west of Building E5481. This building is not included in the extensive completion report prepared in 1919 for Edgewood Arsenal or on maps (Marshall and Ellicott 1919) and did not appear on the 1929 photo mosaic or on the 1941 or 1942 maps of Edgewood Arsenal (Edgewood Arsenal 1929, 1941, 1942). The massing of the building with its barely pitched roof suggests that the building is post World War II construction. The one-story building measures approximately 35 (2 bays) x 60 (3 bays) feet. It is constructed with a steel frame and clad in corrugated transite siding. The shallow pitched gable roof is sheathed in composition roll roofing. The building has metal-frame industrial sash windows. A single metal door is located in the east elevation. Two metal overhead roll doors are located in the south elevation. The earliest documented use for this building was as a miscellaneous filling plant from 1962 to 1966; it served as a degreasing plant between 1966 and 1968. Between 1969 and 1987, the building was a laundry facility for special washing and treating of chemical-agent contaminated protective clothing. Since 1987, the building has been underutilized (EAI Corporation, Building E5483; U.S. Army Soldier and Biological Chemical Command, Historical Research and Response Team, building vertical files).

Building E5429, constructed in 1948, is a one-story building constructed of structural clay tile on a poured concrete foundation (EAI Corporation, Building E5429). The building measures approximately 112 (6 bays) x 32 (2 bays) feet (HABS 1982; APG real property records). The doorways are located in the outer bays of the long elevations. Metal overhead track doors occupy the door openings. The windows in the building are paired six-light, metal-frame units with concrete sills. The gable roof is sheathed with modern standing-seam metal. The roof overhangs the side elevations that once had concrete loading platforms near the doorways. Between 1948 and 1960, the building was used as a warehouse. Between 1960 and 1980, it was used as an indoor pistol range (EAI Corporation, Building E5429).

Facility E5120 was a substation established in 1969. A concrete pad was laid; the area is protected by physical security measures. Transformer equipment was installed.

Building E5687 is a one-story storage building constructed in 1947 as a storehouse. The building is located east of Building E5685 and measures approximately 13 (1 bay) x 15 (1 bay) feet. The foundation is concrete. The exterior walls are ridged structural clay tile. The shed roof is sheathed with corrugated metal. The front (west) elevation contains one metal door. A window opening is located in the south elevation.

POST COLD WAR ERA (Post 1989)

Building E5339 was constructed as a dispatch building in 1990. It stands on the corner off Hanlon Road inside a storage compound. The area is protected by physical security measures. The building measures 4(1 bay) x 4 (1 bay) feet. The wood-sided building rests on a concrete foundation. The building has windows in all elevations and a single door in the north elevation. The gable roof is sheathed with composition roll roofing.

Facility E5359 was constructed in 1995 as a general wash building. It is located in a paved compound west of Hoadley Road. The tall one-story building measures 42 (1 bay) x 40 (1 bay) feet. It rests on a concrete slab and has metals walls and a metal gable roof (APG real property records). A large metal overhead track door is located in the north and south elevations.

A small wood-frame, one-story guard shack (no number on building) is located in the northwest corner of the compound that contains Building E5359; this compound is protected by physical security measures. The gable roof is sheathed with composition roll roofing. The exterior walls are clad with horizontal wood siding. A single door occupies the south elevation. Single one-over-one-light windows are located in the east and west elevations.

Building E5362 was constructed in 1992 as a flammable materials storehouse. The one-story building measures approximately 17 x 21 feet. The building has metal-sided walls and a shed roof and rests on a concrete slab (APG real property records). A single metal roll door occupies the north elevation.

Facility E5600 is a one-story communication center constructed in 2000. The structure measures 22 x 13 feet and has concrete foundation, walls, and shed roof. The south elevation has a single metal door. The other elevations are blind.

Building E5240 is an emergency operations center constructed in 1995. The one-story building is constructed of textured grey concrete block. The windows are large modern fixed units. The roof is flat. An addition was constructed on the building in 1999. The building is protected by physical security measures (APG real property records).

Buildings 5307TB, T5307TA, and 5137T are modern prefabricated modular temporary office buildings. Buildings 5307TA and TB are located north of Hanlon Road. Building 5317T is located north of Fleming Road.

Miscellaneous Storage Buildings

Buildings E5164 and E5162 are small storage buildings located east of Building E5165. Building E5164 was constructed in 1991. The one-story building rests on a concrete slab and has metal walls and shed roof. An overhead metal roll door occupies the west elevation.

Building E5162 is a one-story, partially-enclosed storage building that rests on a concrete slab. The storage area is enclosed with metal siding on three sides and has a green translucent shed roof. The south elevation is protected by physical security measures.

Building E5686 is a one-story, prefabricated metal storage building that measures 36 x 15 feet. It is located east of Building E5685 and was erected in 1992. The structure rests on a concrete curb foundation and has an overhead roll door in the west gable end.

Building E5684 is a slightly larger, one-story, prefabricated metal storage building located east of Building E5685. It was erected in 1992. The structure rests on a concrete curb foundation and has an overhead roll door in the west gable end.

Building E5051 was constructed in 1993 west of Building E5050. The structure measures 16 x 10 feet and has two compartments to store gas cylinders. The structure rests on a concrete slab and has corrugated fiberglass walls and roof. The area is protected by physical security measures.

Non-Historic Resources

Several buildings constructed during the Cold War era located in the Edgewood Arsenal Industrial Area have been previously evaluated as not eligible for listing in the National Register of Historic Places by the Maryland Historical Trust acting as SHPO. These include Building E5002, the Credit Union constructed in 1985; Building E5184, a storehouse for flammable materials constructed in 1985; Building E5189, a general purpose storehouse constructed in 1954; Building E5634, a bottled gas storage facility constructed in 1984; Building E5327, a storehouse for flammable materials constructed in 1958; and, Building E5050 constructed as an explosives processing plant in 1965.

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Edgewood Arsenal Industrial Area Table of Resources

Bldg #	Historic Building Name	Date	Building Type	Current Use	Property Type	Recommended NR Status
E1890	Empty Shell Storage Building	1918	Storage	Vacant	Building	Not NR Eligible
E1930	Magazine Storage Building	1918	Storage	Administration	Building	Not NR Eligible
E1932	Magazine Storage Building	1918	Storage	Administration	Building	Not NR Eligible
E1936	Warehouse-Flammable Materials	1920 ca.	Storage	Administration	Building	Not NR Eligible
E1942	Magazine Storage Building	1918	Storage	Administration	Building	Not NR Eligible
E1946	Administration	1924	Administration	Administration	Building	Not NR Eligible
E1950	Magazine Storage Building	1918	Storage	Administration	Building	Not NR Eligible
E1958	Magazine Storage Building	1918	Storage	Administration	Building	Not NR Eligible
E5002	Credit Union	1985	Administration	Administration	Building	Not NR Eligible
E5005	Foundry	1918	Industrial	Storage	Building	Not NR Eligible
E5026	Warehouse-General Purpose	1941	Storage	Storage	Building	Not NR Eligible
E5027	Warehouse-General Purpose	1941	Storage	Administration	Building	Not NR Eligible
E5049	Storehouse-Powder	1919	Storage	Vacant	Building	Not NR Eligible
E5050	Explosives Processing Plant	1965	Vacant	Vacant	Building	Not NR Eligible
E5051	Gas Cylinder Storage	1993	Storage	Vacant	Structure	Not NR Eligible
E5057	Warehouse-General Purpose	1942	Storage	Storage	Building	Not NR Eligible
E5058	Warehouse-General Purpose	1942	Storage	Storage	Building	Not NR Eligible
E5060	Warehouse-General Purpose	1942	Storage	Storage	Building	Not NR Eligible
E5061	Warehouse-General Purpose	1942	Storage	Storage	Building	Not NR Eligible
E5101	Arsenal Headquarters Building	1943	Administration	Administration	Building	Not NR Eligible
E5108	Compressor House	1918	Industrial	Vacant	Building	Not NR Eligible
E5117	Water Tower	1918	Utility	Vacant	Structure	Not NR Eligible
E5120	Substation	1969	Utility	Utility	Structure	Not NR Eligible
E5124	Fuel Oil Tanks	2002	Utility	Storage	Structure	Not NR Eligible
E5125	Storehouse-Flammable Materials	1918	Storage	Storage	Building	Not NR Eligible
E5126	Central Power Plant Building	1918	Utility	Utility	Building	Not NR Eligible
E5127	Fuel Oil Tanks	2002	Utility	Storage	Structure	Not NR Eligible
E5128	Substation	1942	Utility	Utility	Structure	Not NR Eligible
E5135	Paint Shop	1920 ca.	Industrial	Storage	Building	Not NR Eligible
E5136	Pilot Plant-Storage	1925 ca.	Storage	Storage	Building	Not NR Eligible
E5137	Compressor House	1918	Industrial	Storage	Building	Considered eligible for NR listing in 1996 for purposes of Section 106 undertaking to modify exterior. In 2006 re-evaluated as not individually NR eligible on DOE HA-2094.
E5140	Warehouse-General Purpose	1942	Storage	Storage	Building	Not NR Eligible
E5141	Hand Grenade Filling Plant	1918	Industrial	Administration	Building	Not NR Eligible
E5146	Air Conditioning Support Building	1964	Utility	Utility	Building	Not NR Eligible
E5158	Shell Dump	1918	Industrial	Administration	Building	Not NR Eligible
E5162	Open Storage	1946	Storage	Storage	Structure	Not NR Eligible
E5164	Storehouse	1991	Storage	Storage	Structure	Not NR Eligible
E5165	Shell Dump	1918	Industrial	Administration	Building	Not NR Eligible
E5172	Storehouse-Flammable Materials	1945	Storage	Storage	Building	Not NR Eligible
E5173	Battery Charging House/Motor Generating House	1918	Industrial	Shop	Building	Not NR Eligible
E5176	Deep Well House	1942	Utility	Vacant	Building	Not NR Eligible
E5179	Shell Dump	1918	Industrial	Administration	Building	Not NR Eligible
E5180	Fire Station	1918	Administration	Administration	Building	Not NR Eligible
E5181T	Storehouse-Post Engineer	1932	Storage	Storage	Building	Not NR Eligible
E5182	Storehouse-Flammable Materials	1932	Storage	Storage	Building	Not NR Eligible
E5183	Central Guard House	1918	Administration	Administration	Building	Not NR Eligible

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Edgewood Arsenal Industrial Area Table of Resources

Bldg #	Historic Building Name	Date	Building Type	Current Use	Property Type	Recommended NR Status
E5184	Storehouse-Flammable Materials	1985	Storage	Storage	Building	Not NR Eligible
E5185	Mustard Gas Munitions Filling Plant	1942	Industrial	Industrial	Building	Not NR Eligible
E5188	FS, CNS, CNB Filling Plant	1942	Industrial	Industrial	Building	Individually NR Eligible-documented on MIHP form HA-1852
E5190	Storehouse-Flammable Materials	1942	Storage	Storage	Building	Not NR Eligible
E5232	Maintenance Machine Shop	1918	Industrial	Administration	Building	Not NR Eligible
E5234	Storehouse-Inert Storage	1942	Storage	Administration	Building	Not NR Eligible
E5236	Water Treatment Plant	1941	Utility	Utility	Building	Not NR Eligible
E5239	Housing for Cooling Tower Pumps	1942	Utility	Utility	Building	Not NR Eligible
E5240	Emergency Operations Center	1995	Administration	Administration	Building	Not NR Eligible
E5242	Storage	1942	Storage	Storage	Building	Not NR Eligible
E5244	Warehouse-General Purpose	1942	Storage	Storage	Building	Not NR Eligible
E5246	Warehouse-General Purpose	1942	Storage	Storage	Building	Not NR Eligible
E5265	Smoke Munitions Plant	1918	Industrial	Industrial	Building	Not NR Eligible
E5267	Smoke Munitions Plant-Storage	1918	Storage	Storage	Building	Not NR Eligible
E5269	Smoke Munitions Plant-First Fix Mix	1942	Industrial	Storage	Building	Not NR Eligible
E5282	Storehouse-Incendiary Bomb Materials	1942	Industrial	Vacant	Building	Not NR Eligible
E5286	Unknown	1943	Unknown	Recreation	Building	Not NR Eligible
E5292	Incinerator	1923 ca.	Utility	RUIN	Building	Not NR Eligible
E5294	Incinerator	1943	Utility	Utility	Building	Not NR Eligible
E5296	Sewage Pumping Station	1941	Utility	Utility	Building	Not NR Eligible
E5307	Chemistry Laboratory	1921	Research	Administration	Building	Not NR Eligible
E5307TA	Administration	Post 1989	Administration	Administration	Building	Not NR Eligible
E5307TB	Administration	Post 1989	Administration	Administration	Building	Not NR Eligible
E5317T	Administration	Post 1989	Administration	Administration	Building	Not NR Eligible
E5317	Acid Concentrator Building	1918	Industrial	Vacant	Building	Not NR Eligible
E5325	Chlorine Liquification Plant	1918	Industrial	Vacant	Building	Individually NR Eligible-documented on MIHP form HA-1993
E5327	Storehouse-Flammable Materials	1958	Storage	Storage	Building	Not NR Eligible
E5329	Fuel Pump Building	1942	Utility	Utility	Building	Not NR Eligible
E5330	Heating Plant	1942	Utility	Utility	Building	Not NR Eligible
E5339	Dispatch Building	1990	Administration	Administration	Building	Not NR Eligible
E5340	Water Tower	1941	Utility	Storage	Structure	Not NR Eligible
E5342	Water Tower	1941	Utility	Storage	Structure	Not NR Eligible
E5352	Phosgene Mixing Building	1918	Industrial	Administration	Building	Not NR Eligible
E5354	Phosgene Mixing Building	1918	Industrial	Storage	Building	Not NR Eligible
E5356	Storehouse-Flammable Materials	1942	Storage	Storage	Building	Not NR Eligible
E5357	Phosgene Plant-Ammonia Compressor House	1918	Industrial	Administration	Building	Not NR Eligible
E5359	General Wash Facility	1995	Utility	Utility	Building	Not NR Eligible
E5360	Phosgene Mixing Building	1918	Industrial	Administration	Building	Not NR Eligible
E5361	Substation	1942	Utility	Utility	Structure	Not NR Eligible
E5362	Flammable Materials Storehouse	1992	Storage	Storage	Building	Not NR Eligible
E5365	Phosgene Mixing Plant	1942	Industrial	Administration	Building	Not NR Eligible
E5373	Storage-Flammable Materials	1941	Storage	Storage	Building	Not NR Eligible
E5375	Storehouse-Flammable Materials	1942	Storage	Vacant	Building	Not NR Eligible

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Edgewood Arsenal Industrial Area Table of Resources

Bldg #	Historic Building Name	Date	Building Type	Current Use	Property Type	Recommended NR Status
	Cooling Tower	1942 ca.	Utility	Utility	Structure	Not NR Eligible
E5380	CN Manufacturing Plant	1942	Industrial	Vacant	Building	Individually NR eligible, documented on MIHP form HA-1994
E5425	Administration-General Purpose	1918	Administration	Vacant	Building	Not NR Eligible
E5427	Car Filling Building	1918	Industrial	Administration	Building	Not NR Eligible
E5429	Storehouse	1948	Storage	Storage	Building	Not NR Eligible
E5440	Mustard Gas Plant	1918	Industrial	Vacant	Building	Individually NR eligible-documented on MIHP form HA-2095
E5441	Change House	1918	Administration	Vacant	Building	Not NR Eligible
E5452	Mustard Gas Plant	1918	Industrial	Vacant	Building	Individually NR eligible-documented on MIHP form HA-2096
E5476	Mustard Redistillation Plant	1920 ca.	Industrial	Vacant	Building	Not NR Eligible
E5481	Pilot Plant	1921 ca.	Industrial	Vacant	Building	Not NR Eligible
E5483	Protective Clothing Laundry	1951 ca.	Industrial	Vacant	Building	Not NR Eligible
E5485	Pilot Plant-Fan House	1922	Industrial	Vacant	Building	Not NR Eligible
E5487	Pilot Plant	1922 ca.	Industrial	Vacant	Building	Not NR Eligible
E5489	Office, Laboratory, First Aid, Locker Building	1922	Utility	Vacant	Building	Not NR Eligible
E5554	Laboratory-General Purpose	1943	Research	Research	Building	Not NR Eligible
E5560	Sulphur Chloride Still Building	1918	Industrial	Administration	Building	Not NR Eligible
E5600	Communications Center	2000	Utility	Utility	Structure	Not NR Eligible
E5602	Caustic Storage Building and Tanks	1941	Industrial	Storage	Structure	Not NR Eligible
E5604	Chemical Munitions Filling Plant	1942	Industrial	Administration	Building	Not NR Eligible
E5609	Storage-Oil	1918	Storage	Storage	Building	Not NR Eligible
E5611	Storehouse-General	1918	Storage	Storage	Building	Not NR Eligible
E5634	Bottled Gas Storage	1984	Storage	Storage	Structure	Not NR Eligible
E5635	Adamsite Plant-Manufacturing/Filling	1941	Industrial	Vacant	Building	Not NR Eligible
	Animal Pens near E5635	1980s	Industrial	Vacant	Structure-2	Not NR Eligible
E5637	Adamsite Plant-Manufacturing/Filling	1941	Industrial	Vacant	Building	Not NR Eligible
E5641	Adamsite Plant-Administration	1941	Industrial	Administration	Building	Not NR Eligible
E5642	Greenhouse attached to Building E5641	1982	Industrial	Industrial	Structure	Not NR Eligible
E5643	Adamsite Plant-Manufacturing/Filling	1941	Industrial	Vacant	Building	Not NR Eligible
E5645	Adamsite Plant-Manufacturing/Filling	1941	Industrial	Vacant	Building	Not NR Eligible
E5648	Adamsite Plant-Manufacturing/Filling	1941	Industrial	Vacant	Building	Not NR Eligible
E5654	Warehouse-Inert Storage	1942	Storage	Storage	Building	Not NR Eligible
E5681	Substation	1942	Utility	Utility	Structure	Not NR Eligible
E5684	Storage	1992	Storage	Storage	Building	Not NR Eligible
E5685	Collective Protector and Canister Plant	1941	Industrial	Vacant	Building	Not NR Eligible
E5686	Storage	1998	Storage	Storage	Building	Not NR Eligible
E5687	Storehouse-General	1947	Storage	Storage	Building	Not NR Eligible
E5690	Water Pumping Station	1941	Utility	Utility	Structure	Not NR Eligible
E5699	Guard House	1942	Administration	Vacant	Building	Not NR Eligible
E5703	Warehouse-General Purpose	1941	Storage	Storage	Building	Not NR Eligible
E5707	Warehouse-General Purpose	1941	Storage	Storage	Building	Not NR Eligible

8. Significance

Inventory No. HA-2069

Period	Areas of Significance	Check and justify below		
__ 1600-1699	__ agriculture	__ economics	__ health/medicine	__ performing arts
__ 1700-1799	__ archeology	__ education	__ industry	__ philosophy
__ 1800-1899	__ architecture	__ engineering	__ invention	__ politics/government
_x_ 1900-1999	__ art	__ entertainment/ recreation	__ landscape architecture	__ religion
__ 2000-	__ commerce		__ law	__ science
	__ communications	__ ethnic heritage	__ literature	__ social history
	__ community planning	__ exploration/ settlement	__ maritime history	__ transportation
	__ conservation		_x_ military	__ other: ____

Specific dates	1917, 1942	**Architect/Builder**	US Army Quartermaster Corps
Construction dates	1917-1918, 1939-1943		

Evaluation for:

___x___ National Register ___x___ Maryland Register _____not evaluated

Prepare a one-paragraph summary statement of significance addressing applicable criteria, followed by a narrative discussion of the history of the resource and its context. (For compliance projects, complete evaluation on a DOE Form – see manual.)

SUMMARY

Edgewood Arsenal is sited on Gunpowder Neck in Harford County, Maryland. Edgewood Arsenal was founded in 1917 as the first chemical warfare production facility in the United States. It was established in response to the appearance of toxic gas weapons on the European battlefields. Because commercial chemical companies were reluctant to invest in such weapons, the U.S. government decided to build its own industrial production plant. Edgewood Arsenal remained the only government-owned and operated chemical warfare installation in the U.S. until World War II, when three other government-owned chemical warfare production arsenals were established. Edgewood Arsenal continued as the headquarters of the expanded chemical warfare program and the center for specialized and experimental tasks (Cannan et al. 1996). Although established as a separate installation, Edgewood Arsenal currently is known as Edgewood Area of nearby Aberdeen Proving Ground. The two installations were joined administratively in 1971.

The purpose of this MIHP form is to evaluate 130 buildings contained in the Edgewood Arsenal Industrial Area (E5000 blocks), both individually and as a district, applying the National Register Criteria for Evaluation (36 CFR 60.4 (a-d)). Edgewood Arsenal has a significant association with events that have shaped the broad patterns of U.S. military history during the first half of the twentieth century (1917-1945) (National Register Criterion A). However, the surviving buildings and structures in the Edgewood Arsenal Industrial Area, both individually and collectively, no longer retain sufficient integrity to convey specific important associations necessary to illustrate that historic context. Rather than illustrating the progressive evolution of chemical warfare production, the buildings in the Edgewood Arsenal Industrial Area read as a disjointed assemblage of industrial buildings that reflect expedient design without cohesion in plan.

The World War I and II buildings and structures are not significant individually or as a group for their physical design or construction applying National Register Criterion C. The industrial buildings often were designed to house chemical-specific processes, but then were adapted to suit production schedules and changing munitions requirements. The original purpose of each building is not inherent in its exterior design or appearance. The buildings have been adapted to other purposes many times since their construction and no longer reflect the industrial processes that the buildings once contained. No original equipment is located in the buildings to illustrate historical industrial processes.

The Edgewood Arsenal Industrial Area retains minimal integrity as a district illustrating the chemical weapons production activities that occurred on the installation during World Wars I and II. The industrial landscape as planned during World War I was substantially altered by the activities that occurred on the installation during World War II. Major industrial buildings were removed and other buildings were constructed to accommodate changing production technology. The overall

design of the World War I industrial landscape was modified by World War II construction, and the resulting industrial landscape was reshaped following World War II to meet military objectives of the Cold War era. The overall industrial landscape has been compromised by the removal of building complexes and elements that linked the buildings. Examples of complexes of production buildings that have been demolished include the mustard gas plant active in World Wars I and II, the phosgene plant active in World Wars I and II, the World War I chlorine plant, the World War II chlorine plant, and the World War II clothing impregnation plant. The overall landscape no longer retains integrity to illustrate the dense industrial development that characterized the shell filling and chemical production areas during World Wars I and II.

RESOURCE HISTORY

World War I (1917-1918)

Edgewood Arsenal was established as a new U.S. Army military installation in October 1917 in response to the introduction and use of toxic gas weapons on the battlefields in Europe during World War I. During the early years of the war, France, Britain, and Germany investigated the use of chemical agents for battlefield use. The German army first used chlorine gas successfully as a chemical weapon in April 1915 at Ypres. Chlorine gas was loaded into cylinders, which were then positioned to release a greenish-yellow gas cloud with a strong, suffocating odor that caused debilitating and lethal choking when it floated over enemy troops. The Allied troops responded to this technological innovation by developing protective devices, such as gas masks, and chemical weapons and delivery systems of their own. The introduction of other chemicals soon followed. The Germans began using phosgene, a lethal choking and blistering agent, and, in July 1917, introduced mustard gas, a lethal blistering agent that affected the eyes and lungs (Smart 1997; Crowell 1919:399).

When the United States entered World War I on the side of the Allies on 6 April 1917, the U.S. Army had very little experience with chemical weapons. The U.S. Army had begun to study the use of protective masks in fall 1915, but no work was conducted on gases. On 3 April 1917, the military established the Subcommittee on Toxic Gases, which included members from the Bureau of Mines and ordnance and medical officers from the U.S. Army and Navy. The mission of the subcommittee was to investigate the use and production of toxic gases and their antidotes for combat purposes. The subcommittee began organizing research on chemical agents at universities and industry. The subcommittee actively involved civilian chemists to meet the new challenge (Smart 1997). In addition, French and British Allies shared substantial information to the Trench Warfare Section of the U.S. Army Ordnance Department.

Initially, the U.S. War Department assigned responsibility for chemical defense to the Medical Department, while the Ordnance Department was responsible for chemical munitions. The Corps of Engineers was assigned the responsibility for deploying chemical weapons (Smart 1997). On 28 June 1918, the Chemical Warfare Service was established and assigned all oversight responsibilities for chemical gas production, chemical weapons, and protective devices (Smart 1997; Marshall and Ellicott 1919a:4-7).

No specific authorization for the establishment and construction of Edgewood Arsenal was located in the official records (Marshall and Ellicott: 1919a:4). The arsenal grew from a proposal in June 1917 to construct an experimental filling plant. In August 1917, Lt. Colonel Edwin M. Chance of the Trench Warfare Section was assigned the task of preparing plans for a toxic gas filling plant. After studying the plans of filling plants in France and England, Chance studied American commercial bottling plants. He found that the task for filling milk bottles and carbonated beverage bottles was most relevant to filling projectiles with toxic gases (Smart 1995:21).

Gunpowder Neck was selected as the site for the new filling plant after Gunpowder and Bush Necks were acquired by presidential proclamation on 16 October 1917 and assigned to the Ordnance Department (Marshall and Ellicott: 1919a:4). Bush Neck became a new ordnance proving ground named Aberdeen Proving Ground, while Gunpowder Neck became known as the U.S. Filling Plant, Gunpowder Reservation. In April 1918, the name of the reservation was changed to Edgewood Arsenal (Marshall and Ellicott: 1919a:13-14).

Edgewood Arsenal was an experimental installation and was assigned new missions over the 18 months it was under construction. Initial War Department plans for the new installation comprised a small filling plant. Construction contracts were signed with the Central Construction Corporation in October 1917 (Marshall and Ellicott 1919a:43). Actual work on shell filling plant # 1 began on 15 November 1917 (*Journal of Industrial and Engineering Chemistry* 1919:6-7; Marshall and Ellicott 1919b). The shell filling plant was sited on the northern portion of Gunpowder Neck with access to the Pennsylvania Railroad line. In terms of the current installation layout, the shell filling plants occupied the eastern half of the arsenal's industrial core east of Hoadley Road and west of Wise Road. The primary construction contractor, Central Construction Corporation, was aided in the plant's construction by the Triumph Ice Machine Company, the Link-Belt Company, the Waterbury-Farrel Foundry and Machine Company, the Reynolds Machine Company, the Liquid Carbonic Company, the Karl Kiefer Machine Company, and the Spray Engineering Company (Smart 1995:21).

Construction of shell filling plant # 1was begun before the final designs were completed. The overall size of the filling plant was expanded to include two additional filling plants, so that many changes to the overall building designs and overall installation layout occurred during the construction process (Marshall and Ellicott 1919a:43-44). As completed, the U.S. Filling Plant, Gunpowder Reservation comprised three separate shell filling units. Shell filling unit #1, constructed between November 1917 and May 1918, had four wings arranged in an X centered on a central power plant (Building E5126). Each wing contained one filling tunnel. Shell filling plant # 2, constructed between April and September 1918, also had four wings that contained two filling tunnels each. Shell filling plant #3, completed by December 1918, was the smallest plant, containing two wings with three filling tunnels in each wing and a compressor house (Building E5108). The utilitarian buildings were generally constructed of steel frame clad with corrugated metal siding because of availability of materials. Structural clay tile was also used as a construction material.

The shell filling process typically started with empty shells retrieved from the empty shell storage building (Building E1890). The empty shells were placed on trucks on conveyor belts. The conveyor belts moved the shells through the filling tunnels in the plants where automated machines filled the shells with chemical gases. The shells were then conveyed to the closing room for inspection and closing with plugs that also contained exploding charges. The shells were then transferred to the leak testing and painting department located in the shell dumps (Buildings E5179, E5165, and E5158). After painting and labeling, the shells were transferred to the magazine storage area (Buildings E1930, E1932, E1942, E1950, and E1958) for packing and shipment (Marshall and Ellicott 1919b:2-10).

The War Department planned to purchase toxic gases from private industry to supply the shell filling plants at Edgewood Arsenal. The four primary chemical agents in World War I were chlorine, phosgene, chlorpicrin (a lethal tearing agent), and mustard gas. However, phosgene, chlorpicrin, and mustard gas had no commercial value; only chlorine and a small amount of phosgene were produced commercially in the U.S. prior to World War I. Commercial chemical companies were reluctant to develop industrial production facilities with no post-war use. The dangerous nature of the agents used in chemical weapons also deterred commercial manufacturers. In addition, railroad operators placed restrictions on transporting

chemical gases. Consequently, the War Department revised plans for Edgewood Arsenal to include chemical production plants. Designs for the new chemical production plants were readied during December 1917 (*Journal of Industrial and Engineering Chemistry* 1919:7; Crowell 1921:396). The chemical plant area was sited west of the shell filling plants and present-day Hoadley Road.

The chemical plants originally were designed to manufacture phosgene and chlorpicrin. Contracts were let in December 1917, January 1918, and February 1918. Anticipated completion date for the plants was July 1918. In response to the need to produce chemicals quickly, the decision was made to construct steel-frame buildings on concrete foundations clad with corrugated siding. It was anticipated that temporary construction materials would be replaced with more permanent materials at a later date (Marshall and Ellicott 1919c:2).

Chlorpicrin, a coughing and tearing agent, was made from a reaction of picric acid and chlorine. The process was contained in one building (no longer extant) at Edgewood Arsenal. Production of chlorpicrin began at the arsenal in June 1918. Between 14 June and 11 November 1918, the plant produced 2,320,000 pounds of chlorpicrin (Crowell 1919:400-401).

Phosgene was a lethal choking and blistering agent that proved to be one of the deadliest gases used during World War I. The production of phosgene required numerous processes contained in a complex of buildings. Phosgene is formed from combining chlorine and carbon monoxide in the presence of a catalyzer. To produce this gas, the following buildings were constructed: oxygen producing plant (no longer extant), carbon monoxide producing plant (no longer extant), carbon dioxide producing plant (no longer extant), buildings for drying the gases before combining them (no longer extant), mixing buildings (Buildings E5352, E5354, E5360), ammonia refrigeration plant (Building E5357), storage buildings, and gas holding tanks (no longer extant). Construction of the approximately 20 buildings and structures comprising the phosgene plant at Edgewood Arsenal began in February 1918 and was completed by July 1918, when operations started. By Armistice Day, the plant had produced 935 tons of phosgene (Crowell 1919:401-403; Marshall and Ellicott 1919c:2-10; Marshall and Ellicott 1919a:18-19).

The third toxic gas production plant constructed at Edgewood Arsenal was the mustard gas plant. The mustard gas plant was the last plant added to the chemical production area. The production of mustard gas was a relatively new technology to U.S. chemists since it was first introduced on the battlefield in 1917. The overall plant comprised 58 buildings and structures, including four mustard gas mixing buildings (Buildings E5440 and E5452), a compressor house, a dryer building, a pump house, an oil heater building with brick stack, a still house, a sulphur chloride building, a drum filling building, a car filling building (Building E5427), a shower bath and toilet building (Building E5441), and a laundry, locker, and washroom building for workers. The complex also had a number of gasholders, tank storage, scrubbing towers, and fan houses. Four buildings remain from this complex: two mustard gas mixing buildings, one car filling building, and the shower bath and toilet building.

The first mustard gas plant finished for operation was Building E5440. Construction began on 19 May and was completed 2 August 1918 by Levering and Garrigues Company. Gas production in this building commenced 3 August 1918 using 34 small type G, lead-lined French reactors and three settling tanks. About three weeks after Building E5440 entered operation, the method of mustard gas production was altered to use sulphur monochloride in Levenstein reactors. Mustard gas production in Building E5440 was halted on 21 August 1918 (Marshall and Ellicott 1919c:70-79; Smart 1995:28). The second mustard gas plant, Building E5452, entered operation on 1 October 1918. This building was adapted for the new

process of mustard gas production and was equipped with an 8-ton Levenstein reactor and settling tanks (Marshall and Ellicott 1919c:70-79).

Building E5450 (no longer extant), the third mustard gas plant, also was equipped with a Levenstein reactor. The building was constructed between 19 May and 3 August 1918, and entered operation on 1 November 1918. The fourth plant was constructed between 19 May 1918 and 29 August 1918, but never was placed into production; it became a storehouse (Crowell 1919:403-407; Marshall and Ellicott 1919c:69-135). By 11 November 1918, the amount of mustard gas produced at Edgewood Arsenal was 711 tons (Crowell 1919:403)

By early 1918, it was apparent to War Department planners that chlorine supplied by private industry was insufficient to meet the anticipated requirements for chemical weapons production. Chlorine was involved in the production of several gases, particularly chlorpicrin and phosgene. The War Department decided to build a chlorine and caustic soda manufacturing plant alongside the collection of shell filling plants and chemical plants at Edgewood Arsenal. Contractors Foundation Company of New York City were notified in March 1918 to begin construction of the chlorine production area. By 27 March 1918, the site for the new plant was selected west of Canal Creek and northwest of the chemical production area. Plans for the chlorine plant were received in late April; construction began 1 May 1918. Machinery arrived in June and the plant was ready to operate by 15 July 1918. The plant comprised a cell house, an electric substation, a brine building, a boiler and evaporation building, a caustic fusion building, and a liquefying plant (Building E5325) to condense and liquefy 50 tons of chlorine per day. The chlorine plant actually began operations in September 1918 when the chemical plants were ready to receive the chlorine gas. At the time of its completion, the chlorine plant at Edgewood Arsenal was the largest chlorine production plant in the United States (Crowell 1919:397-400; Marshall and Ellicott 1919a:8, 25-26, 40-42).

Only Building E5325 remains from the chlorine plant that once comprised 28 buildings and structures. The building was constructed to ensure high-quality chlorine required to manufacture phosgene. The efficient manufacture of phosgene required 95 percent concentration of pure chlorine, while most commercial chlorine manufacturers achieved 75 percent concentration. The chlorine liquefication plant (Building E5325) was equipped to purify commercially produced chlorine and was ready for operation by early September 1918. However, the Edgewood Arsenal's chlorine plant produced 98 percent pure chlorine that could be piped directly to the phosgene plant. Some equipment tests occurred in Building E5325 to prove that the plant operated as designed, but it was not placed into operation (Marshall and Ellicott 1919c:62-64).

By Armistice Day on 11 November 1918, Edgewood Arsenal functioned as an integrated production line to accommodate the multi-step process of chemical weapons manufacturing, even through it was built in various stages over 18 months. The installation included an area to assemble and produce raw materials, the chemical manufacturing plants, the shell filling plants, a finishing area where shells were tested for leakage and painted for labeling, and above-ground magazines to store chemical munitions prior to shipment. The installation contained 360 permanent buildings, 274 temporary buildings, and 31 miscellaneous structures, such as gasholders, tanks, scrubbing towers, stacks, and silos (Marshall and Ellicott 1919a:16, 53). The buildings were linked with overhead metal steam lines, gas lines, and railroad tracks. At the time that the Armistice ending World War I was signed in November 1918, all production at the arsenal ceased. Although most buildings in the complex were operational, full production capacity was not anticipated until December 1918.

The Chemical Plant area contained approximately 150 buildings and structures (Marshall and Ellicott 1919a:16-26). Currently, ten (10) buildings from World War I are located in the chemical plant area. As designed, the chemical plants at Edgewood Arsenal had a 24-hour daily production capacity of 40 tons of phosgene gas, 25 tons of chlorpicrin gas, 30 tons of

mustard gas, and 50 tons of chlorine gas (Marshall and Ellicott 1919a:47). Crowell (1919:401, 402, 403) reported that actual chemical production at Edgewood Arsenal comprised 2,320,000 pounds of chlorpicrin, 935 tons of phosgene, and 711 tons of mustard gas.

When completed, the shell filling plant area contained approximately 135 buildings and structures (Marshall and Ellicott 1919a:16-26). Of these, ten (10) buildings remain extant. The proven 24-hour capacity for the three shell filling plants was as follows (Marshall and Ellicott 1919a:47-48):

22,000 75mm shells filled with mustard gas (H.S.);
22,000 75mm shells filled with N.C. (a smoke mixed from chlorpicrin and stannic chloride) or phosgene (C.G.);
7,300 4.7mm shells filled with mustard gas (H.S.);
7,300 4.7mm shells filled with N.C. and phosgene (C.G.)
15,000 155mm shells filled with mustard gas (H.S.) or phosgene (C.G.);
5,000 155mm shells filled with N.C. or phosgene (C.G.);
700 155mm shells filled with white phosphorus (W.P.);
6,350 Stokes mortar filed with white phosphorus (W.P.);
1,200 Livens projectors filled with phosgene (C.G.);
20,000 gas grenades; and,
20,000 white phosphorus (W.P.) grenades.

In actuality, by the time of Armistice Day (11 November 1918), the shell filling plants at Edgewood Arsenal had completed shipment of 450,000 75mm shells filled with poison gas; 400,000 hand grenades filled with gas or phosphorus; 18,600 Livens projectiles filled with gas; 3,806,600 pounds of chlorpicrin in bulk; 840,000 pounds of phosgene in bulk; and, 380,000 pounds of mustard gas in bulk (Marshall and Ellicott 1919a:47). In addition, the arsenal had on hand 3,000 tons of various gases awaiting disposition.

Marshall and Ellicott (1919a:45) opined: "It is to be regretted that this magnificent plant did not come into full production as planned." Most of the under capacity production resulted from lack of shells, boosters, and closing plugs required to complete chemical munition rounds.

Construction at Edgewood Arsenal also included utilities and personnel support facilities for military personnel serving at the arsenal. Because of the dangers involved, the government employed enlisted soldiers at the facility rather than civilian workers. At its peak, 7,400 soldiers worked at Edgewood (Crowell 1921:494). Personnel support facilities included permanent barracks, temporary barracks, officers' quarters, a large permanent hospital, and temporary support buildings such as a Post Office and a YMCA building (NARA RG 92; Construction Division, Completion Reports, Edgewood Arsenal).

Utilities included a dam and a water purification system, now known as the Van Bibber Filtration Plant, on Winters Run to supply potable water to the installation. A separate salt water system was installed for fire prevention. The Army constructed a major powerhouse (Building E5126) that supplied electricity and steam heat to the industrial plants. A second power plant was located on the Bush River. In addition, an electric transmission line hookup to the local power utility company was established. The Army built an internal railroad system over 35 miles on the installation to facilitate internal movement of raw materials and toxic gases (Marshall and Ellicott 1919d:2). A wharf was built on Bush River to facilitate direct shipment of chemical weapons from the installation (NARA RG 92, Construction Division, Completion Reports, Edgewood Arsenal).

Inter-War Period (1919-1939)

After World War I, Edgewood Arsenal remained a permanent installation, but at a much reduced level of activity. The National Defense Act of 1920 established the Chemical Warfare Service (CWS) as a permanent branch of the Regular Army separate and distinct from the Ordnance Department. The mission of the new service comprised development, procurement, and supply of all offensive and defensive chemical warfare materiel and smoke and incendiary weapons. In addition, the CWS was responsible for general training of Army personnel in chemical warfare, as well as organizing, equipping, and training specialists in chemical warfare (Smart 1997). With the exception of headquarters located in Washington, D.C., all activities of the CWS were concentrated at Edgewood Arsenal.

However, a general abhorrence for chemical warfare as practiced during World War I limited the role of this new service. In 1924, the Chemical Warfare Service was confined to studying defensive measures and equipment and to preparing a modest deterrent or retaliatory capability; the United States would not develop chemicals as an offensive measure (Brophy 1959a:21-23).

Within this framework, Edgewood Arsenal served as the primary CWS installation and became the center of training, stockpiling, and research and development for chemical warfare materiel. The major chemical industrial plants and filling plants were placed on standby status. A few small additional pilot plants were constructed on the installation, including Buildings E5476 and E5483 constructed in 1920-1921 for experimental production of Diphenylaminechlorarsine (DM) and Building E5487 constructed in 1922 for experimental Lewisite production (EAI Corporation, Buildings E5476 and E5487).

In 1928, the CWS selected seven agents and smokes as the most important chemical agents in the military arsenal. The seven agents were mustard agent (HS), methyldiflourarsine (MD), diphenylaminechlorarsine (DM), chloroacetophenone (CN), titanium tetrachloride (FM), white phosphorus (WP), and hexachlorethane (HC). Phosgene (CG) and Lewisite (L) were considered of lesser importance, and chlorpicrin (PS) and chlorine (Cl) were rated least important (Smart 1997). Throughout this time, military planners hypothesized that the chemical agents likely to be used in any future war would be the same ones used in World War I. Mustard agent was considered to be the principal agent for combat use. Stockpiles of chemical agents that remained from World War I were stored at Edgewood. In 1937, the mustard gas production plant was rehabilitated and produced 154 tons to increase that stockpile. That same year, the phosgene production plant was renovated for production (Smart 1997).

During the inter-war era, workers at Edgewood tested methods for dispersing chemical agents from aircraft and perfected the 4.2-inch chemical mortar for battlefield use. They also developed improved gas masks and means of impregnating clothing to protect against toxic gases. The Chemical Warfare School, which trained both Army and Navy personnel, also operated at Edgewood (Brophy 1959a:28-31). Other activities included the research and development of insecticides, especially for use on ships.

World War II (1940-1945)

During World War II, President Roosevelt declared that the United States would not use chemical weapons offensively, but would retaliate with chemical weapons defensively. The warning read: "Any use of gas by any axis power, therefore, will immediately be followed by the fullest possible retaliation upon munition centers, seaports, and other military objectives

throughout the whole extent of the territory of such axis country" (Smart 1997). This warning had its desired effect. The Axis powers never resorted to the use of toxic gases, although the U.S. knew that both Germany and Japan had chemical agent capabilities. The full extent of those capabilities was only known after the end of the war. Germany had approximately 78,000 tons of chemical warfare agents, while Japan had about 8,000 tons. In contrast, the U.S. produced approximately 146,000 tons of chemical agents between 1940 and 1945 (Smart 1997).

The CWS headquartered at Edgewood Arsenal was in charge of preparations to protect troops against the use of chemical weapons and to activate chemical warfare if instigated by the enemy. In 1940, Edgewood Arsenal was organized into the following primary divisions: Production Division, Technical Division, Chemical Warfare Depot, and Ordnance Division. The Production Division was in charge of manufacturing all chemical warfare munitions, supplies, and equipment, including manufacture of chemical agents, filling of chemical munitions, and production of protective devices. The Technical Division was the research, design, and experimental section of the organization. The Technical Division investigated and developed new chemical munitions and applications from design and experimentation to specifications for manufacture. The Chemical Warfare Depot received, stored, and issued supplies. The Ordnance Division assembled chemical munitions ("History of Edgewood Arsenal" ca. 1945:512).

During the protective mobilization phase leading up to the formal declaration of World War II following the bombing of Pearl Harbor on 7 December 1941, the CWS underwent a major expansion in personnel and activity. Beginning in 1939, educational orders were placed with private industry for the production of gas masks. Approximately 80,000 gas masks were procured under this program, and additional storage for CWS supplies was needed. In June 1940, President Roosevelt signed the Military Appropriations Act of 1941 that authorized major increases in military spending. Preparations for possible war continued to escalate following the passage of the Lend-Lease Act in March 1941. The overall personnel strength of the CWS increased to 800 officers and 5,000 enlisted men. CWS appropriations increased to over $60 million during fiscal year 1941 as a result of successive military supplemental appropriations (Smart 1997).

CWS prepared for the contingency that chemical weapons might be deployed on the battlefield. Initially, CWS efforts were focused on construction and renovation projects at Edgewood Arsenal, the service's only chemical warfare installation. Between 1 September 1939 and 7 December 1941, $27 million dollars of the total CWS budget of over $64 million were directed towards new construction and repair projects at Edgewood Arsenal (Brophy et al. 1959). Each division within the Edgewood Arsenal administrative structure required additional facilities in order to perform wartime functions. The Technical Division began construction of new laboratories in what is now the E3300 block east of Ricketts Point Road. The Ordnance Division constructed a new ordnance assembly plant (HA-2049) and the Chemical Warfare Depot completed a new storage area (HA-1988). The expansion at the arsenal is described by the following statistic. In June 1940, the number of buildings at Edgewood Arsenal numbered 498. In June 1945, the total number of buildings on the installation was 1,269 comprising 669 permanent buildings, 259 cantonment type buildings (i.e., temporary), and 342 buildings described as "miscellaneous temporary types" ("History of Edgewood Arsenal" ca. 1945:606).

The Edgewood Arsenal Industrial Area was mostly under the control of the Production Division. In 1940, the Production Division comprised the Production Central Office, the Machine Shop, the Gas Mask Factory, and the Filling Department. In July 1940, total personnel employed in the Production Division numbered approximately 700; the number of employees rose to approximately 4,600 in July 1943. Fifty percent of civilian employees were African American and women were employed as manpower became scarce ("History of Edgewood Arsenal" ca. 1945, Chapter 26, Appendix B). In 1940, the mission of the Production Division was:

"1. To manufacture and prepare for shipment chemicals and chemical agents. To fill, close, paint, and ship to Ordnance Assembly Plants, shell, rockets, grenades, etc., with chemical or smoke fillings. To fill, assemble, pack, and ship smoke and irritant mortar shell, grenades, pots, candles, bombs, etc. To fill and assemble where required, or to manufacture any CWS or other item where facilities are available or can be made available at request of Industrial Division, OC-CWS.
2. To manufacture metal components for various types of material including gas masks, grenades, pots, candles, bombs, artillery shell, mortar shell, fuzes, etc. To manufacture special machinery such as filling lines, closing devices, presses, etc. and also jigs, fixtures, dies and tools for such machinery. To assemble special shells and to assemble various kits, protective devices, etc. To perform mechanical maintenance work and to do mechanical work in manufacture and repair of all types of manufacturing equipment, tools, etc.
3. To manufacture and pack, gas masks and gas protective devices of all types. To process, assemble and pack maintenance sets, field laboratories, decontamination equipment, etc. To do all types of special processing and packing on CWS and other items" ("History of Edgewood Arsenal" ca. 1945:526-527).

In 1939, the CWS planned that Edgewood Arsenal Industrial Area would be used for mass production of chemicals and filling of chemical shells similar to the functions it had served during World War I. Consequently early projects undertaken in the Edgewood Arsenal Industrial Area included renovating and upgrading the mustard gas plant (no longer extant) and the phosgene plant (no longer extant) to working order and the construction of new filling plants. The earliest projects planned were the horse gas mask factory (no longer extant), collective protector and canister plant (Building E5685), the Adamsite (DM) manufacturing plant (Buildings E5635-E5648), and the mustard filling plant (Building E5185). The architectural engineering firm Whitman, Requardt & Smith-Engineers of Baltimore, Maryland, served as the general contractors on the project. The construction contractors were Cummins Construction Co. and Riggs Distler Construction Co. of Baltimore, Maryland. Initially the work was coordinated by the U.S. Army Quartermaster Corps. On 4 December 1941, all construction activities were transferred to the U.S. Army Corps of Engineers. At that time, approximately 50 percent of the total construction undertaken at Edgewood Arsenal was completed. The chlorine production plant (no longer extant) was the last production plant constructed at Edgewood Arsenal; it was constructed between March and December 1942 ("History of Edgewood Arsenal" ca. 1945).

The new construction dramatically reshaped the Edgewood Arsenal Industrial Area. The World War I filling plants #1 and #2 that dominated the center of the industrial area were removed by January 1942 (Edgewood Arsenal 1919, 1942). Of the three shell filling plants constructed during World War I, shell filling plant # 3 (no longer extant), the smallest one, remained in use during World War II. Storage buildings, shops, and utility buildings were constructed in the location of the former World War I shell filling plants. The World War I utility buildings were upgraded with new equipment. Most of the remaining World War I buildings were adapted to other uses.

Construction of new shell filling plants occurred west of Hoadley Road, east of Canal Creek, north of Fleming Road, and south of Magnolia Road. New shell filling plants included Buildings E5185, E5188, E5604, and E5600 block. The World War II shell filling plants generally were constructed of metal frames on concrete foundations and were clad in corrugated transite. In general, the World War II shell filling buildings were larger in scale than their World War I counterparts, but more compact in their interior arrangements. While the World War II shell filling plants were designed to contain specific chemical filling lines, the purposes for which they were used changed when the buildings entered active service. The equipment installed in the buildings was adapted to accommodate different types of shells and different types of chemicals as

required by production schedules. Thus, the exterior appearances of the buildings were unrelated to the actual processes contained in the buildings.

In all, twelve filling plants operated at Edgewood Arsenal during World War II. The filling plants included WP filled munitions in Building E5032 (no longer extant), H filled munitions in Building E5185, frangible grenades in Building E5002 (no longer extant), CG filling plant in Building E5604, PWP filling plant in Buildings E5188 and 501 (no longer extant), training munitions filling plant in Building E5354, Adamsite filling plant in the Building E5600 block, smoke munitions in Building E5265, HC and CN filled munitions in Buildings E5452 and 5440, and PTI filling plant in Building E5325 (Edgewood Arsenal Plant Status 1946; "History of Edgewood Arsenal" ca. 1945).

During World War II, the chemical production area remained in the same general area as the World War I chemical plants. This area was generally defined by Hoadley Road on the east, Canal Creek on the south and west, and Fleming Road on the north. Mustard gas production remained in the same general area as in World War I; none of the World War II mustard production buildings remain extant. Phosgene production occurred north of the World War I phosgene production buildings in new and upgraded buildings located north of Hanlon Road; none of the World War II phosgene production buildings are extant. The buildings in the chemical production area originally designed for one purpose often were adapted to contain other purposes as soon as they were built. For example, Building E5365 constructed in 1942 was originally planned as a phosgene (S3/S4) mixing building. When completed, the building was equipped with shoe impregnation equipment (EAI Corporation, Building E5365). Buildings E5352, E5354, and E5360, formerly part of the World War I phosgene production plant, were adapted by the machine shop to recondition and manufacture shells.

During World War II, ten chemical manufacturing plants operated at Edgewood Arsenal. Each plant typically comprised a group of buildings and structures that supported the manufacturing processes. The following is a list of the World War II chemical plants that operated at Edgewood Arsenal: CN manufacturing in Building E5380 (Plant 2), sulphur monochloride plant in Building E5370 (no longer extant), impregnating and decontaminating agents in Building E5625 block (no longer extant), phosgene in E5300 block (Plant 7) (no longer extant), chlorine (no longer extant), mustard in Building E5450 (Plant 6) (no longer extant), CC2 (Plant 8) (no longer extant), whetlerite in Building E5427, distilled mustard agent in Building E5476, and CN in Building E5440 (Plant 1) (Edgewood Arsenal Plant Status 1946; "History of Edgewood Arsenal" ca. 1945).

The gas mask factory was located west of Canal Creek in the area of the former World War I chlorine manufacturing plant. During World War II, this area contained four buildings that produced protective equipment. The buildings included the gas mask factory (no longer extant), the horse mask factory (no longer extant), and the Collective Protector Factory (Building E5685). During construction of the building, it was determined that it was inadequate for manufacturing parts and assembling the canisters. Parts manufacturing was accomplished in other buildings, while the canisters were assembled in Building E5685 ("History of Edgewood Arsenal" ca. 1945:542-548).

Storage in the industrial area also became critical during World War II. Storage space was at a premium for materials, supplies, and components for the manufacturing and filling plants and shops. During 1941 and 1942, general storage buildings were constructed to support activities in the industrial area. Eight storage buildings (Buildings E5026, E5027, E5057-E6061, E5703, and E5707) were located off Magnolia Road west of Hoadley Road and four warehouses (Buildings E5140, E5242, E5244, and E5246) were sited on the site of the former World War I shell filling plant. In addition, igloos and above-ground magazines (E5700 block) to handle explosive materials were constructed to support the industrial area.

The expansion of the filling plants, manufacturing plants, and increased numbers of employees resulted in an expansion of administrative functions. A new arsenal headquarters building (Building E5101) was completed in 1943 to consolidate all administrative functions for arsenal operations. The U.S. Army Corps of Engineers and Van Rensselaer P. Saxe were the consulting engineers on the construction; Cummins Construction Corporation was the contractor (APG drawings files; HABS 1982). As soon as the building was completed, it was manned round the clock during the war years.

Utilities (i.e., electricity, water, and sewerage) in the Edgewood Arsenal Industrial Area were expanded to accommodate the dramatic construction boom during World War II. The main power house (Building E5126) was upgraded with new electrical generating equipment and boilers to generate steam heat. The steam heating system in the industrial area was expanded through the construction of an additional high-pressure steam plant (Building E5330) fueled by oil. Steam heat was distributed throughout the industrial area by a system of above-ground metal steam pipes. The steam pipes were a characteristic feature of the industrial area until the late twentieth century, when a systematic removal of the above-ground steam pipes was initiated. Sources of drinking water were expanded through the construction of deep wells and a water treatment plant (Building E5236) capable of treating 2 million gallons per day. Two additional elevated water storage tanks (Structures E5340 and E5342) were constructed in the chemical plant area. The first installation-wide sewage treatment plant was constructed near Bush River. The industrial area was linked to the sewage treatment plant by underground pipes and a sewage pumping station (Building E5296) was located in the industrial area. Refuse disposal was accommodated through the construction of a second incinerator (Building E5294) on Noble Road ("History of Edgewood Arsenal" ca. 1945:619-633).

Between July 1940 and June 1942, the entire production load for CWS items was handled at Edgewood Arsenal, excepting items normally procured from private industry suppliers. However, early in the planning stages, it was realized that the industrial capabilities at Edgewood Arsenal were limited and additional production installations were needed to meet the potential demand for chemical weapons. Between 1941 and 1943, CWS established three new chemical production arsenals and associated ordnance assembly and storage facilities. Construction of the Huntsville/Redstone Arsenal, Alabama, began in 1941; the facility opened in early 1942. Pine Bluff Arsenal in Arkansas opened in 1942, followed by Rocky Mountain Arsenal in Colorado 1943 ("History of Edgewood Arsenal" ca. 1945). The locations of these arsenals were selected applying criteria established by the Ordnance Department. These installations were located in the interior of the U.S., away from coastlines and borders to minimize the danger of enemy air raids. The sites also had access to rail transportation and an abundant water supply. As a result of the site criteria, most of the ammunition production facilities were constructed in the Midwest and Southeast (Whelan et al. 1997).

As originally planned, Huntsville Arsenal mass produced smoke munitions; Rocky Mountain Arsenal produced large-scale chemical agents; and, Pine Bluff Arsenal primarily manufactured incendiaries and incendiary bombs. The plan for Edgewood Arsenal was to assume the roll of intermediary between the Technical Division's pilot lines and either industry or the larger production arsenals. By 1942, most large-scale manufacturing for CWS items was completed at the three larger arsenals or by private industry. After 1942, the activity at Edgewood Arsenal was characterized as: "... the types of jobs being sent to Edgewood are in the majority fill-in jobs, stop-gap jobs awaiting proper facilities on the outside, and small jobs which are not economical for the more industrially organized arsenals"("History of Edgewood Arsenal" ca. 1945:512).

The Edgewood Arsenal Industrial Area became the center for specialized and experimental tasks, such as the establishment of pilot plants to test new chemicals and new production processes. The experiments were completed on temporary

production lines by experienced personnel and under the control of the Technical Division. In this way, the production could be standardized prior to the implementation of large-scale industrial production ("History of Edgewood Arsenal" ca. 1945:513). However, it was necessary to have some large-scale production jobs in order to retain trained production personnel.

Orders that were filled at Edgewood Arsenal during World War II included chemical production, incendiary bombs, and gas masks. The largest single job was 1,346,625 gas masks manufactured in 1941, as well as gas masks for horses, goats, and dogs ("History of Edgewood Arsenal" ca. 1945:510). Specialty items included the manufacture in Building E5265 of the incendiary bombs dropped by Brig. Gen. James Doolittle and his airmen on Tokyo, Japan, in April 1942. Actual chemical production included 908,601 lbs CN; 5,281,534 lbs CNB solution; 3,258,500 lbs CNS solution; 4,742,255 lbs sulphur monochloride; 551,252 lbs PWP; over 23.2 million lbs CG; over 77.4 million lbs chlorine; over 87.4 million lbs caustic; and, over 34.8 million lbs H (Edgewood Arsenal Plant Status 1946). These statistics compare with overall CWS production among the four chemical production arsenals of over 40.4 million lbs CG; over 371.9 million lbs chlorine; over 174.6 million lbs H (Chemical Corps 1945). Thus, Edgewood Arsenal produced approximately 55 percent of CG, 25 percent of the entire H production; and, 20 percent of overall chlorine production. Edgewood Arsenal production capacity was eclipsed by the production figures of the three larger manufacturing arsenals. During World War II, CWS remained a relatively small program compared to the overall ordnance procurement program. CWS operated four production arsenals and six chemical warfare depots, while the Ordnance Department operated 35 ordnance works that produced propellants and high explosives, 31 ordnance assembly plants that produced completed ammunition rounds, and 24 ammunition depots (Cannan et al. 1996; Whelan et al. 1997).

Cold War (1946-1989)

The Cold War era generally is defined as the period beginning in 1946 following Soviet activities to retain territory liberated from Nazi Germany during World War II and extending to the fall of the Berlin wall in 1989. This period was marked by a tense, hostile relationship between the Warsaw Pact countries led by the U.S.S.R. and the North Atlantic Treaty Organization (NATO) Allies led by the U.S.A. The primary role of the U.S. Army during this time was to support U.S. policies of peace through strength by maintaining ground force readiness as an alternative to strategic nuclear weapons to deter communist expansion (USAEC 1997).

The Cold War era was marked by major organizational changes in the armed forces and accompanied by competition for limited military appropriations among the services. Under the 1947 National Security Act, the Air Force became autonomous from the Army, and the Department of Defense was created. Under the new organizational structure, the Army assumed responsibility for conducting land warfare, providing troops for occupation duty in Central Europe, and providing air defense units within the continental U.S.

Immediately following World War II, the role of chemical warfare was a debated topic. After the end of World War II, the Chemical Warfare Service (CWS) was demobilized and the chemical manufacturing plants and filling plants were closed and placed on standby. Since gas was not used on the battlefields during World War II, some military strategists considered it an antiquated technology, particularly when contrasted with the atomic bomb. The CWS undertook a vigorous defense of its role in the peacetime army and argued in defense of chemical and biological preparedness. In 1946, the CWS was redesignated as the Chemical Corps, a permanent technical corps in the army structure. Edgewood Arsenal was renamed the Army Chemical Center. However, the role of chemical warfare remained a debated topic throughout the Cold War era.

During the Cold War era, the nature of chemical warfare changed. In addition to chemical agents, biological and nerve agents became increasingly important potential weapons. The Chemical Corps also began to research the effects of radiation from atomic devices in order to develop troop protection devices. Edgewood Arsenal during the Cold War became primarily a research and development center under the Technical Division and its subsequent organizations. Chemical manufacturing and filling operations came to a halt, except for occasional special orders. In some cases, manufacturing facilities (e.g., the World War II chlorine plant) were leased to private industry (Smart 1994).

Following a reorganization in 1951, Edgewood Arsenal became the Research and Engineering Center for the Chemical Corps. Activities conducted at Edgewood Arsenal included both basic research and materiel development. The research laboratories focused on the development of chemicals as tactical weapons and on defensive measures to counter potential chemical weapons attack. Basic research included the discovery and development of new chemical agents, incendiaries, and screening and signaling smokes. Materiel development focused on improved weapons delivery and dispersal systems, including flame throwers, chemical mortars, and smoke generators. In addition, the laboratories conducted research into the development of insecticides, rodenticides, and fungicides, as well as tear gas, non-lethal riot control agents, nerve agents, and defoliants (Brophy and Ross 1953; Smart 1994).

Research into defensive measures focused on the development of protective equipment and clothing. Improvements to gas masks for military personnel and civilians resulted in the development of a canister-less gas mask that was introduced during the late 1950s. Detection systems to alert troops to the presence of chemical agents also were researched and developed.

The industrial area played a minor role at the arsenal during the Cold War. The production facilities at Edgewood Arsenal operated as they had during World War II. The Army's main chemical production lines were located at other chemical arsenals, while the facilities at Edgewood were used primarily as experimental pilot plants to produce small orders and specialized items.

During the early 1950s, the production facilities comprised about 100 buildings, including manufacturing plants, power generating units, warehouses, utilities, and other facilities. Primary items manufactured at Edgewood included gas masks, smoke for hand grenades, smoke agents, and nerve agents. During the last twenty years of the Cold War era, major emphasis was placed on the development of irritant and incapacitating agents and binary munitions and agents that kept chemicals separate until deployment (Brophy and Ross 1953; USA Environmental Hygiene Agency 1989).

In 1962, the Chemical Corps was abolished. The laboratories and production facilities at Edgewood Arsenal were placed under the Chemical-Biological-Radiological Agency (CBR Agency), a subordinate element of Munitions Command under AMC. In 1971, Edgewood Arsenal was joined administratively with Aberdeen Proving Ground. Subsequent name changes included Chemical Research and Development Center (CRDC) in 1983; Chemical Research, Development and Engineering Center (CRDEC) in 1986; and, Edgewood Research, Development and Engineering Center (ERDEC) under the U.S. Army Chemical and Biological Defense Agency (CBDA) in 1992. In 1993, the name of CBDA was changed to the U.S. Army Chemical and Biological Defense Command (CBDCOM) (Smart 1994). The current name is U.S. Army Soldier and Biological Chemical Command.

EVALUATION

Maryland Historical Trust
Maryland Inventory of
Historic Properties Form

Inventory No. HA-2069

Edgewood Arsenal Industrial Area, Edgewood Area, Aberdeen Proving Ground
Harford County, Maryland
Continuation Sheet
Number 8 Page 13

The purpose of this MIHP form is to evaluate 130 buildings contained in the Edgewood Arsenal Industrial Area (E5000 blocks), both individually and as a district, applying the National Register Criteria for Evaluation (36 CFR 60.4 (a-d)). The Edgewood Arsenal Industrial Area has been the subject of several cultural resources investigations over the past twenty years. In 1982, the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER), a branch of the National Park Service (NPS), worked with the Army to inventory built resources on Army Materiel Command installations, then known as U.S. Army Development and Readiness Command (DARCOM). During summer 1982, the built resources constructed before 1945 at Edgewood Arsenal were investigated and evaluated within military, regional, and installation historic contexts (Grandine et al. 1982). The surveyors identified the World War I and World War II industrial plants as potentially significant, but recommended additional research to determine specific historical significance (Grandine et al. 1982). The utilitarian support buildings and structures were evaluated as not possessing the qualities of significance.

The buildings in the Edgewood Arsenal Industrial Area were re-surveyed in 1992 during the development of a cultural resources management plan (CRMP) for APG. During this process, historic contexts for the installation were revised and updated and an architectural reconnaissance survey was conducted on buildings constructed before 1951 (36 CFR 60.4 (a-d)) (Goodwin et al. 1993, 1996). The CRMP contained recommendations that the Edgewood Arsenal Industrial Area be evaluated as a possible district for its historical associations with World Wars I and II (National Register Criterion A). Many of the large industrial buildings were classified as "need more information" because detailed building histories were not compiled as part of the reconnaissance architectural survey. Utility buildings and support buildings generally were evaluated individually as "not eligible" for National Register listing (Goodwin et al. 1996).

Since 1996, the APG CRM has completed Maryland Inventory of Historic Properties forms to document several individual industrial buildings prior to demolition in accordance with on-going consultations with the Maryland Historical Trust. Other buildings have been the subjects of a variety of CRM studies. In general, consultants conducting the survey and evaluation studies in the industrial area have concluded that individual buildings are not individually eligible for National Register listing, though a few buildings have been previously evaluated as possessing the qualities for individual listing in the National Register of Historic Places in consultation with the Maryland Historical Trust as the results of Section 106 undertakings. These buildings are E5188 (HA-1852), a miscellaneous shell filling plant; Building E5325, a chlorine liquefication plant; and, Buildings E5440 (HA-2095) and E5452 (HA-2096), two mustard gas plant buildings; and, Building E5380 (HA-1993), a production plant for chloracetophenone (CN), a strong tearing agent. All of these buildings have been documented individually on Maryland Inventory of Historic Properties forms and determination of eligibility forms according to MHT standards. However, the question of whether or not the Edgewood Arsenal Industrial Area is a district has remained unresolved (Robinson & Associates, Inc. 1995, 1996).

Edgewood Arsenal has a significant historical association with events that have shaped the broad patterns of U.S. military history during the first half of the twentieth century (1917-1945) (National Register Criterion A). Edgewood Arsenal was established in 1917 as the first chemical weapons manufacturing installation in the United States, and it was the primary manufacturer of chemical weapons during World War I. The installation was owned and operated by the U.S. Army because of the experimental nature of chemical production and weapons manufacturing. Edgewood Arsenal remained the center of development and manufacturing of chemical agents and weapons and protective equipment until 1942, when three larger chemical manufacturing arsenals were constructed to meet the requirements for expanded production during World War II. After 1942, Edgewood Arsenal no longer functioned as the primary chemical weapons manufacturing plant for the U.S. Army. After 1945, the industrial plants in the Edgewood Arsenal Industrial Area were placed on standby status and

eventually dismantled. During the Cold War era, the main focus of the installation was on research and development and the Edgewood Arsenal Industrial Area played only a minor role in the installation's history.

Although Edgewood Arsenal is associated with a significant theme in twentieth-century U.S. military history, the surviving buildings and structures in the Edgewood Arsenal Industrial Area, both individually and collectively, no longer possess integrity and specific important associations necessary to illustrate that historic context. Rather than illustrating the progressive evolution of chemical warfare production, the buildings and structures represent a disjointed assemblage of industrial buildings that reflect expedient design without cohesion in plan. Of the over 275 buildings in the industrial area constructed during World War I, only 36 buildings remain. In the shell filling area, shell filling plants # 1, 2, and 3 that dominated the industrial landscape are no longer extant. The remaining ten World War I-era buildings in this area are generally support buildings that only served a minor support role to the shell filling plants; these buildings comprise compressor houses (Buildings E5108 and E5137), the shell dumps (Buildings E5158, E5165, and E5179) where finished shells were tested for leaks and painted prior to shipment, a foundry (Building E5005), and two support shops. Building E5141 was constructed as a hand-grenade filling plant and Building E5265 was not completed when the Armistice ending World War I was signed on 11 November 1918. In the chemical area, ten dispersed industrial buildings remain from World War I, including two mustard gas plants (Buildings E5440 and E5452), three phosgene mixing buildings (Buildings E5352, E5354, and E5360), the chlorine liquefication plant (Building E5325), the sulphur chloride still building (Building E5560), an acid concentrator building (Building E5317), a compressor house (Building E5357), and a car filling building (Building E5427). These buildings do not represent complete chemical production complexes, but are isolated unconnected buildings associated with three different chemical production lines. Some buildings were not active during World War I or barely in production by the time the war ended. No evidence of the industrial processes remains in the industrial buildings. The extant chemical production buildings are dispersed over a wide area that once was a dense industrial landscape linked by railroad lines, steam lines, and pipes. The overall industrial character of the chemical area has been compromised by the subsequent removal of buildings, railroad lines, and steam pipes. The other extant World War I buildings were minor storage buildings and utilities that supported the original industrial purpose of the installation. As a whole, the buildings dating from World War I do not illustrate, either individually or as a collection of buildings, the industrial plant of Edgewood Arsenal as it existed during World War I.

The role of Edgewood Arsenal shifted dramatically during World War II. Edgewood Arsenal began the war as the primary chemical production arsenal in the U.S. Army inventory and, by 1943, it was the smallest arsenal of CWS's four chemical production arsenals. Of the 52 World War II buildings remaining in the Edgewood Arsenal Industrial Area, 15 are industrial buildings, most of which functioned as self-contained shell filling buildings, sited independently from each other. The primary chemical production buildings active during World War II are no longer extant. Only two buildings (Buildings E5188 and E5380) were documented as retaining pieces of equipment associated with World War II activities (Grandine and Armstrong 1997). The highest numbers of World War II buildings in the Edgewood Area Industrial Area are storage buildings (n=19) and utility buildings (n=14), which were support buildings to the major industrial activities that occurred on the installation. As a collection of buildings, the buildings constructed between 1940 and 1945 do not convey the industrial plant as it functioned during World War II.

The World War I and II buildings and structures are not significant individually or as a group for their physical design or construction applying National Register Criterion C. The industrial buildings often were designed to house chemical-specific processes, but then were adapted to suit production schedules and changing munitions requirements. The original purpose of each building is not inherent in its exterior design or appearance. The buildings have been adapted to other

purposes many times since their construction and no longer reflect the industrial processes that the buildings once contained. No original equipment is located in the buildings. The construction techniques visible in these buildings were typical of military construction during their construction eras, using widely-available materials. Overall the buildings in the Edgewood Arsenal Industrial Area are functional buildings that lack ornamentation and do not embody distinctive characteristics of a type, period, or method of construction, represent the work or a master, or possess high artistic value under National Register Criterion C. The extant individual buildings in the Edgewood Arsenal Industrial Area no longer illustrate or exemplify the chemical weapons manufacturing history of Edgewood Arsenal under National Register Criterion C.

The Edgewood Arsenal Industrial Area retains little integrity as a district to illustrate the chemical weapons production activities that occurred on the installation during World Wars I and II. The industrial landscape as planned during World War I was substantially altered by the activities that occurred on the installation during World War II. Major industrial buildings were removed and other buildings constructed to accommodate changing production technology. The overall design of the World War I industrial landscape was modified by World War II construction, and the resulting industrial landscape was reshaped following World War II to meet military objectives of the Cold War era. The overall industrial landscape has been compromised by the removal of building complexes and elements that linked the buildings. Examples of complexes of production buildings that have been demolished include the mustard gas plant active in World Wars I and II, the phosgene plant active in World Wars I and II, the World War I chlorine plant, the World War II chlorine plant, and the World War II clothing impregnation plant. The overall landscape no longer retains integrity to illustrate the dense industrial development that characterized the Edgewood Arsenal Industrial Area during its period of significance from 1917-1945.

The Edgewood Arsenal Industrial Area has no known associations with the lives of significant people under Criterion B. It is not anticipated that the complex will yield archeological information important to military activities between 1917 and 1989 under Criterion D.

9. Major Bibliographical References

Inventory No. HA-2069

10. Geographical Data

Acreage of surveyed property	approx. 361 acres		
Acreage of historical setting	approx. 361 acres		
Quadrangle name	Edgewood, MD	Quadrangle scale:	1:24,000

Verbal boundary description and justification

The Edgewood Arsenal Industrial Area comprises the former shell filling plant, the chemical production area, storage buildings, and utilities the form the historic core of Edgewood Arsenal from 1917 through 1945 as drawn on the attached section of the 7.5 minute USGS Edgewood quadrangle map.

11. Form Prepared by

name/title	Katherine Grandine, Senior Historian/Senior Project Manager		
organization	R. Christopher Goodwin & Associates, Inc.	date	October 2005
street & number	241 E. 4th Street, Suite 100	telephone	301-694-0428
city or town	Frederick	state	MD

The Maryland Inventory of Historic Properties was officially created by an Act of the Maryland Legislature to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 supplement.

The survey and inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

return to:

Maryland Historical Trust
DHCD/DHCP
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Crownsville, MD 21032-2023
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Aberdeen Proving Ground, Directorate of Installation Operations (DOI)
Real property records, drawings files.

APG News
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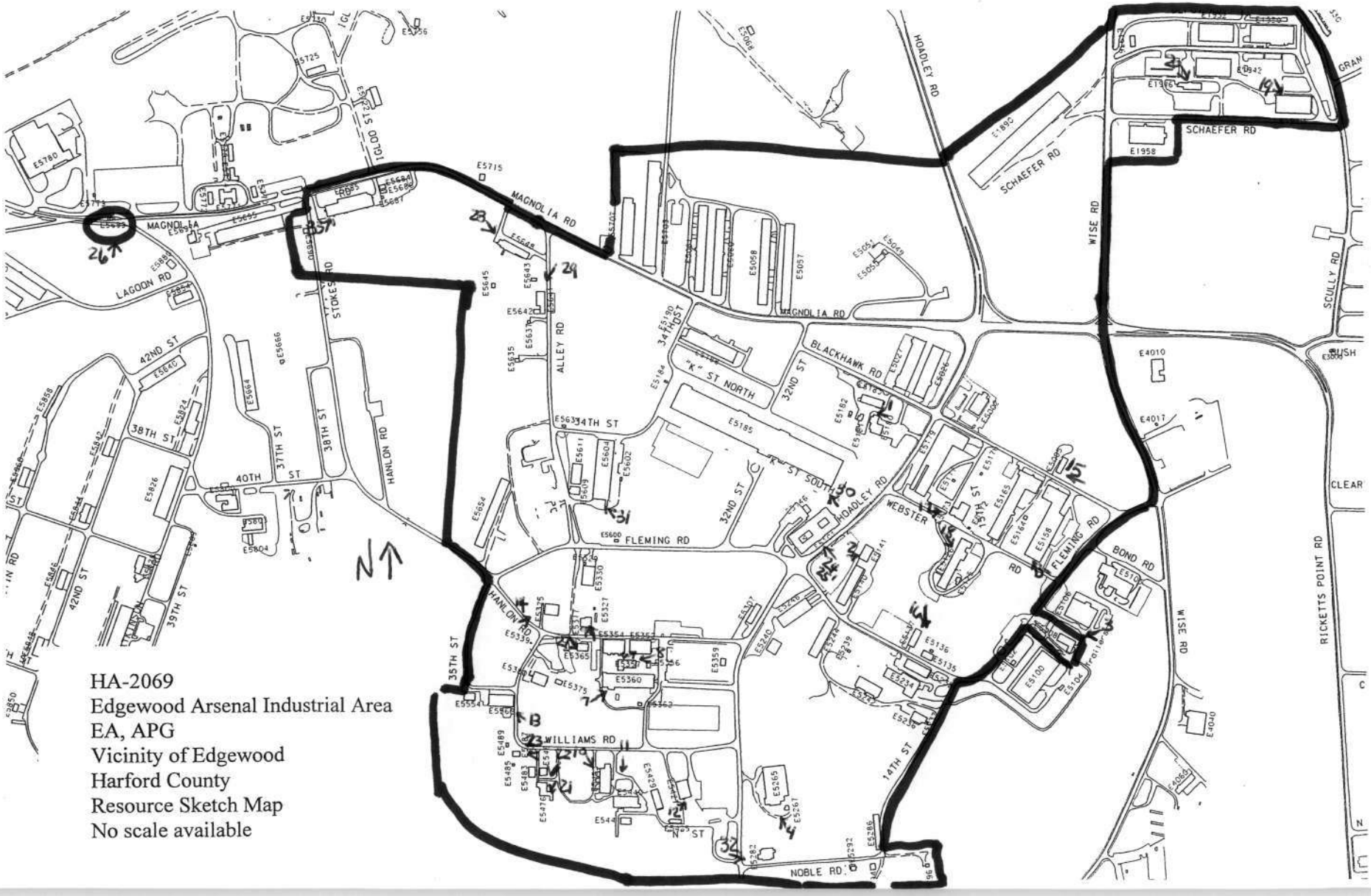
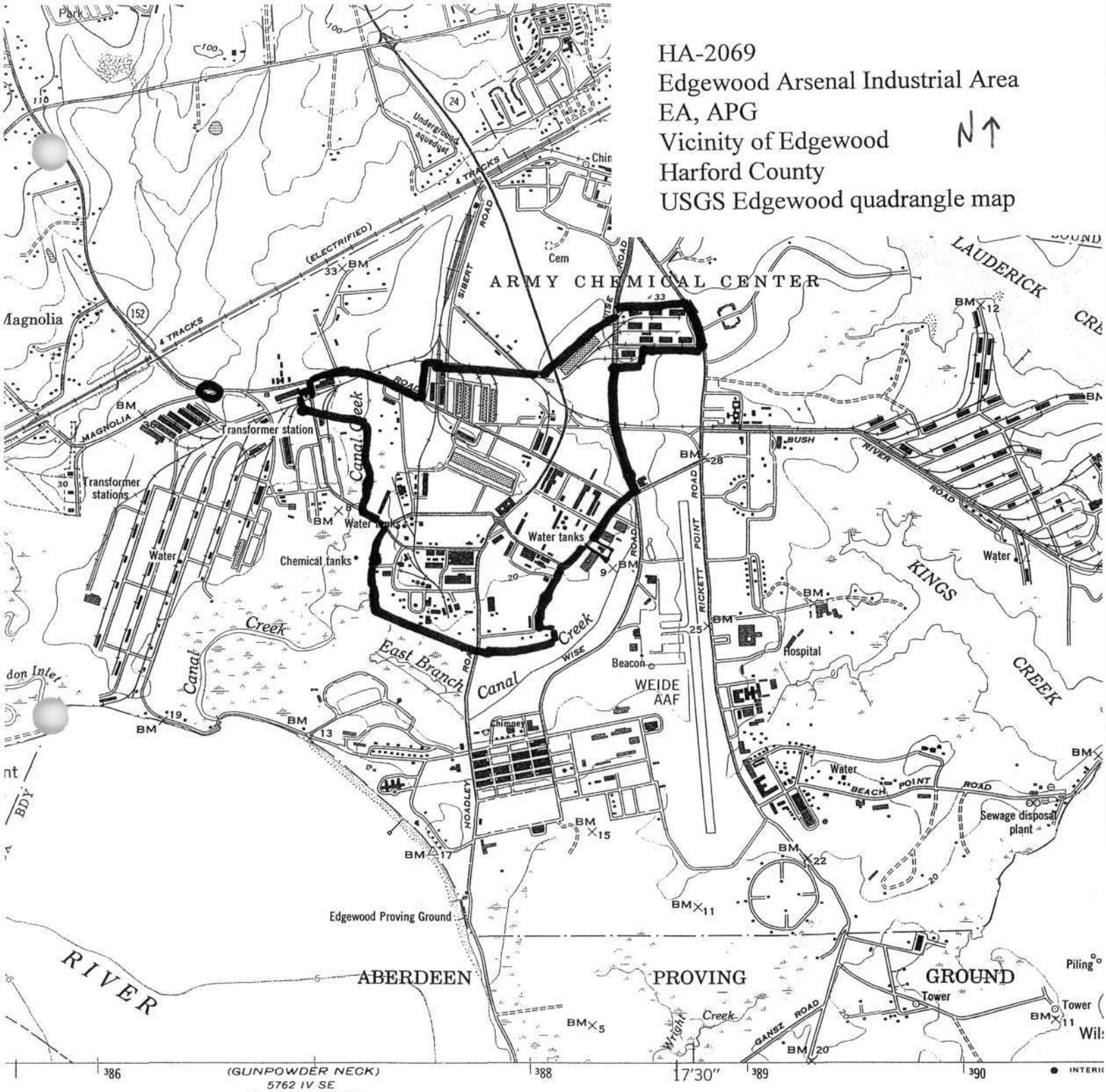


HA-2069
Edgewood Arsenal Industrial Area
EA, APG
Vicinity of Edgewood
Harford County
Resource Sketch Map
No scale available



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HA-2069
Edgewood Arsenal Industrial Area

Slides and photographs documenting HA-2069 are on file at Aberdeen Proving Ground; Directorate of Safety, Health and Environment; Environmental Conservation and Restoration Division.